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ANNALS
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I.

WOOD'S METAL CASTS OF THE EAR.

By George E. Shambaugh, M. D.

CHICAGO.

INSTRUCTOR IN ANATOMY OF THE EAR, NOSE AND THROAT, UNIVERSITY OF CHICAGO, ASSOCIATE IN OTOLOGY, RUSH MEDICAL COLLEGE.

Casts made of the cavities of the middle and internal ear offer the best means for studying the anatomy of these parts of the organ of hearing, especially in reference to the shape of these cavities and their relation to each other. Very little use has been made in this country of such casts for teaching the anatomy of the ear.

The object of this paper is to call attention to the value of such preparations and to describe the methods by which they can be made.

Bezold was the first to elaborate the making of casts and to apply it to the study of the anatomy of the ear in its relations to practical otology, although such casts had for many years been used by anatomists. Hyrtl used this method ex-

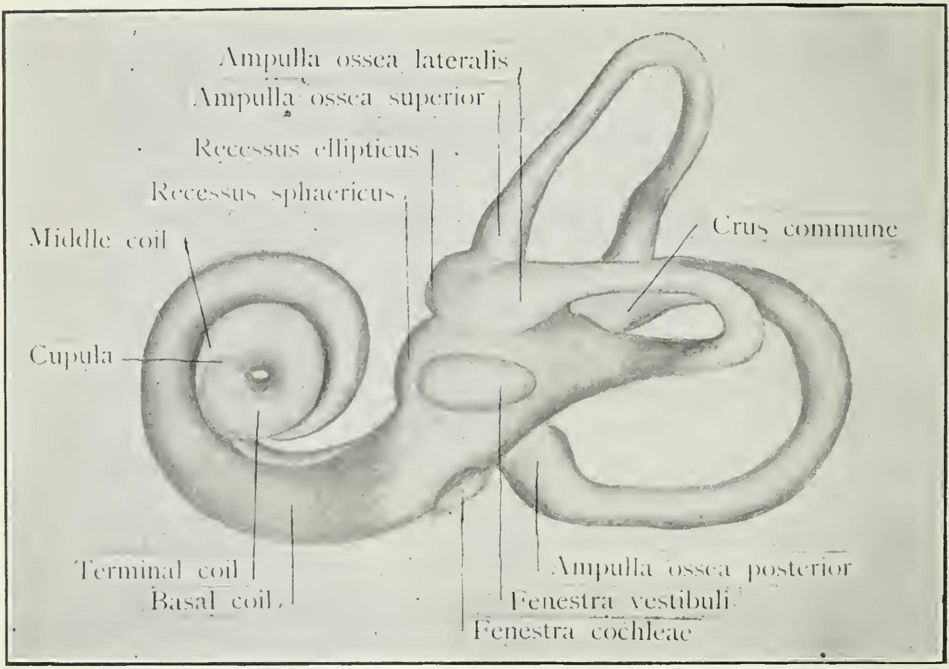
Ampulla ossea lateralis
Ampulla ossea superior
Recessus ellipticus
Recessus sphaericus
Middle coil
Crus commune
Cupula
Terminal coil
Basal coil
Ampulla ossea posterior
Fenestra vestibuli
Fenestra cochleae

Fig. 1.

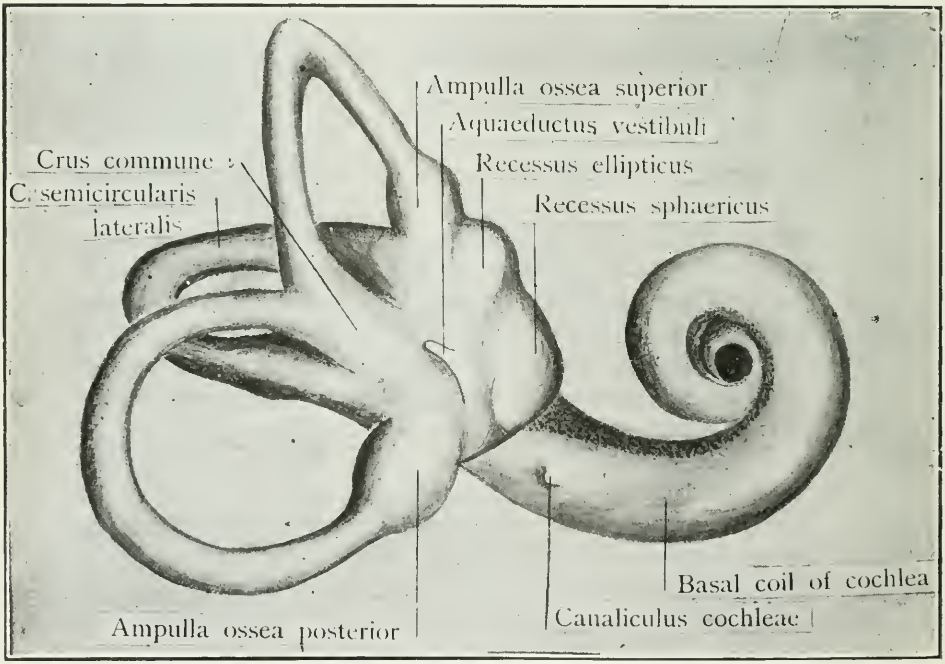
Ampulla ossea superior
Aquaeductus vestibuli
Crus commune
Recessus ellipticus
C. semicircularis lateralis
Recessus sphaericus
Basal coil of cochlea
Canaliculus cochleae
Ampulla ossea posterior

Fig. 2.

tensively in the study of the comparative anatomy of the osseous labyrinth of vertebrates. Bezold states that the first casts of the osseous labyrinth were made as early as 1827 in the laboratory of A. Meckel. In more recent years Siebenmann has made use of this method in a detailed study of the osseous labyrinth

Wax was used by Bezold in making corrosion casts of the ear. Wood's metal has been used in recent years and makes much better casts, as it is more durable and the casts can be handled without so much danger of injuring them.*

Casts may be made of the osseous labyrinth alone, of the osseous labyrinth and the middle ear cavities, or of the middle ear cavities alone.

In making casts of the osseous labyrinth alone, the following method may be used. In a dry temporal bone having all the soft parts removed a horizontal incision is made with a jeweler's saw, removing the squamous portion rising above the upper border of the petrous bone. A second incision is made with the saw through the cavum tympani removing the meatus auditorius externus. An opening is made with a file into the superior semicircular canal on the upper surface of the petrous bone. A small piece of cotton is laid over this opening and held in place with adhesive plaster. The meatus acusticus internus and the fenestra cochleae are closed in the same way, A small piece of glass tubing with a tapering end is inserted into the fenestra vestibuli and held in place preferably by means of a piece of modelling clay. The whole preparation is then embedded in plaster of Paris. This can best be done by taking a small pasteboard box large enough for the bone to lie in while the glass tube alone projects above the top. The bone is placed in the box, care being taken that the glass tube is protected with a plug of cotton and allowed to project above the top of the box. The plaster of Paris is mixed not too thin and poured into the box until the bone is completely covered. After the plaster has set, the box is removed and when the plaster cast is thoroughly dried the preparation is heated before pouring in the Wood's metal. The heating of the preparation is best done by burying it in sand, allowing the glass tube to project, and placing it over a water bath for several hours. This method assures the thorough heating of the preparation while there is no risk of getting the bone too hot since the temperature cannot arise above 100° Centigrade. The preparation is removed from the sand and the metal poured into the glass funnel. The object may be tapped gently against the table until the metal in the glass tube remains stationary indicating that all of the cavities of the labyrinth are filled. When cooled the plaster of Paris can be broken off, and the temporal bone having the osseous labyrinth filled with the Wood's metal placed in a glass dish

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*Celloidin casts can also be made of the labyrinth. Such casts afford a very useful means for studying the blood-vessels in the labyrinth, see "The Distribution of Blood-vessels in the Labyrinth of the Ear," by Geo. E. Shambaugh, University of Chicago Press. 1903.

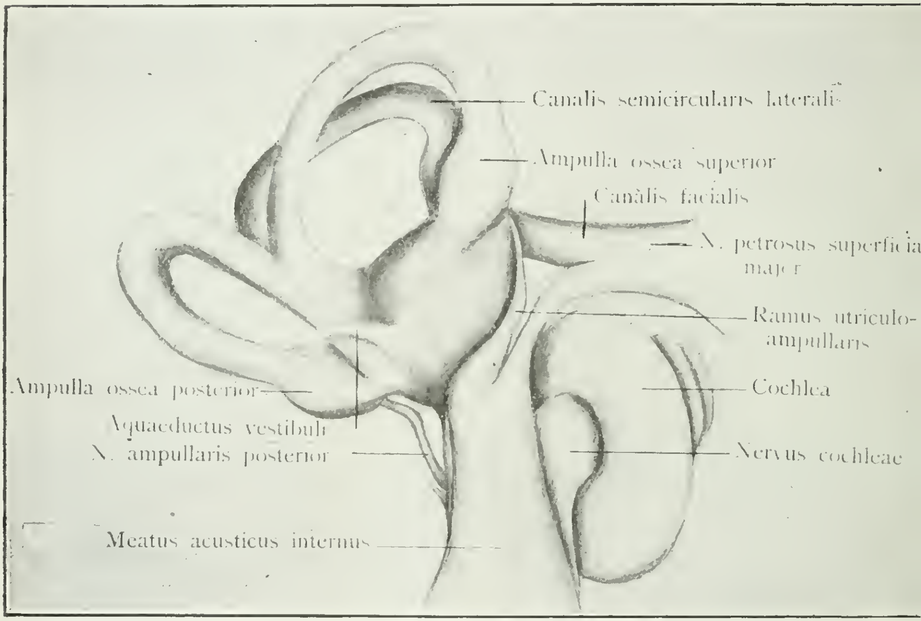

Fig. 3.

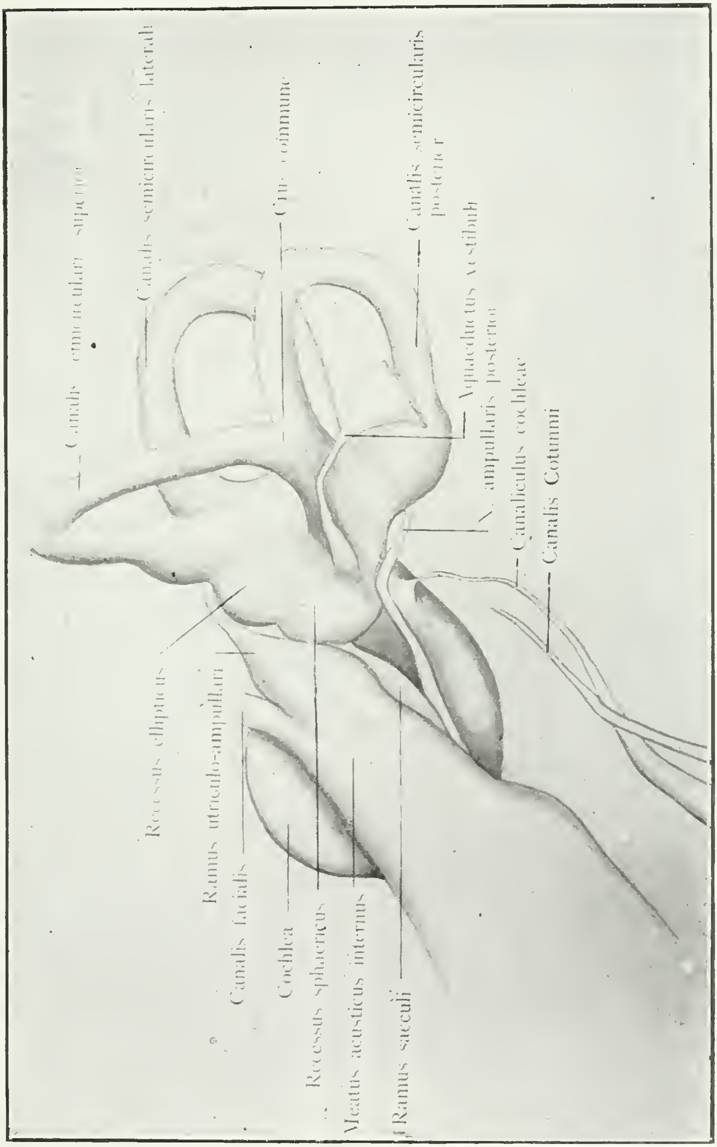
Canalis semicircularis superior
Canalis semicircularis lateralis
Crus commune
Canalis semicircularis posterior
Aquaeductus vestibuli
N. ampullaris posterior
Canaliculus cochleae
Canalis Cotunnii
Recessus ellipticus
Ramus utriculo-ampullaris
Canalis facialis
Cochlea
Recessus sphaericus
Meatus acusticus internus
Ramus sacculi

Fig. 4.

containing a 20 per cent. solution of KOH. The dish can be placed on the coils of the radiator or in a thermostat for several weeks or until the bone has been dissolved. Small pieces of the capsule of the cochlea usually cling persistently to the basal coil. These can often be removed by immersing the preparation for a few minutes in a solution of commercial HCl.

Casts of the osseous labyrinth intended for class-room work may be mounted on a card with an enlarged drawing of the labyrinth having the several parts labelled with their correct anatomical terms. The cast may be attached by a short string to one corner of the card. Figures 1 and 2 represent the anterior and posterior views of a Wood's metal cast of the osseous labyrinth labelled in this way.

Casts may be made of all the cavities of the dry temporal bone by the following method, which is adapted from the method used by Siebenmann. A dried temporal bone is taken with all the soft parts removed. The first step is to make a passage with a small gimlet from the canal for the internal carotid into the cavum tympani. An opening is made into the superior semicircular canal as described above. All the openings leading into the temporal bone with the exception of the inner orifice of the carotid canal are closed in the following manner: The meatus auditorious externus is closed with a piece of card-board cut to fit and held in place with adhesive plaster. The meatus acusticus internus is closed in the same way. The whole base of the petrous bone including the external surface of the carotid canal is covered with a piece of card-board cut to fit and held firmly in place with strips of adhesive plaster in such a way that the space between the bone and the card-board forms a closed chamber into which the Wood's metal can flow, thus forming a firm base for the entire cast. The inner orifice of the carotid canal is the only opening that has not been closed. Into this is placed a funnel made of pliable card-board, and held firmly in place by strips of adhesive plaster. The preparation is then embedded in plaster of Paris as above. Half of a small cigar box with the lid tacked shut forms the best receptacle for the plaster of Paris. The preparation is heated and the metal poured in through the paper funnel exactly as in making the cast of the osseous labyrinth. The subsequent treatment in removing the plaster of Paris and dissolving away the bone has been described above.

These casts of all the cavities of the temporal bone are most instructive. The relations of the several parts of the osseous labyrinth to the middle ear structures are clearly shown, as well as the several divisions of the auditory nerve, the aquaeductus vestibuli, the aquaeductus cochleae, the canalis Cotunnii, and the relation of the facial nerve with the nervus petrosus superficialis major. These structures are represented in Figures 3 and 4 which are detailed sketches from casts of the whole temporal bone.

II.

SYPHILIS OF THE CARTILAGINOUS SEPTUM.

By J. L. Goodale, M. D.

BOSTON, MASS.

The quadrangular cartilage of the nose is to be regarded as one of the least common sites of tertiary syphilis, in marked contrast to the frequency with which the adjacent tissues are involved. The gumma, which exhibits a predilection for the ethmoidal plate, and leads to such extensive destruction, effects the cartilage primarily with great rarity, so that an observer in the consideration of a septal perforation, is influenced largely by its situation, in forming a conclusion as to its syphilitic or non-syphilitic nature.

The object of the following paper is to describe a series of cases of tertiary syphilis, in which the quadrangular cartilage was alone or chiefly involved.

The conditions encountered may be divided as follows:

1. Superficial infiltration and ulceration of the mucous membrane covering the quadrangular cartilage.
2. Deep infiltration and necrosis of the mucous membrane of the cartilage.
3. Granulomatous growths arising from the anterior septal mucous membrane in syphilitic individuals.
4. Excoriations and scars of the anterior septal mucous membrane, occurring in syphilitic individuals.

1. Superficial Infiltration and Ulceration of the Anterior Septal Mucous Membrane.

Cale 1. The patient, a man 35 years of age, came in November, 1903, for blocking of the nose of four months duration. The obstruction had progressively increased, and during the last two months, had been attended by blowing of crusts from the left side. The patient admitted having had gonorrhea about ten years ago, but no history of syphilis could be obtained. Examination of the nose, showed on the left side of the septum anteriorly, a superficial excavation in the mucous membrane, filled with large, greenish crusts, on removal of which a rough, reddened, granular floor was disclosed, surrounded by an irregular, sharply-cut margin, slightly elevated, above its periphery. The elevated margin was moderately firm on pressure, and bled easily on its concave, inner aspect. The floor of this excavation was formed by the cartilage of the septum, which seemed slightly thinned in its center. The margins of the excavation passed with a gentle slope into mucous membrane of normal appearance. The right side of the septum was covered by normal-looking mucous membrane.

A diagnosis was made of a late syphilitic lesion, and the patient was referred to his family physician, with directions for appropriate general treatment. The latter reported to me two months later that the ulcerated process of the septum had markedly improved, and that the patient was breathing easily through the nose.

2. *Deep Infiltration of the Septal Mucous Membrane.*

Case 2. A woman 35 years of age, always in previous good health, married, no children, but no miscarriages, was referred to me by Dr. E. H. Stevens November 1st, 1898, for a progressively increasing bilateral nasal occlusion, first noticed eleven months ago. Examination showed both lower turbinates to be greatly enlarged, the right in contact with the septum, of firm consistence, shrinking but slightly under cocain, and with a pale smooth surface. Eleven days later the right side of the nose externally was seen to have become somewhat swollen over an area 2 cms. in diameter, just anterior to the nasal bone, corresponding to an intranasal swelling on the right side of the cartilaginous septum high up. This septal swelling was firm, covered with a slightly wrinkled mucous membrane of normal color, and passed gradually into the surrounding normal tissue of the septum. A portion of this swelling was removed, together with a part of the right lower turbinate.

Microscopic examination of the specimen from the septum showed the following appearances. The specimen, which is about 4 mms. thick, is covered by columnar, ciliated epithelium, in the interspaces of which are numerous polynuclear neutrophiles. The mucosa is infiltrated with lymphoid cells, plasma cells, and hyaline degenerated cells. The submucous connective tissue is traversed by numerous new-formed blood vessels, lined with swollen endothelial cells. The cells of the connective tissue are seen to be actively proliferating. The mucous glands are numerous and vary considerably in size, many of them appearing much reduced in size, the glandular epithelium atrophied and shrunken, the nuclei of the latter frequently exhibiting fragmentation. The cytoplasm of the glandular cells is in some places swollen, occluding the lumen of the gland, in other places, it shows a granular degeneration. In the deeper portion of the connective tissue there is an irregular development of new formed connective tissue and blood vessels surrounding the glands, which are here in a more advanced state of degeneration and atrophy, many of their nuclei having entirely disappeared, and the site of the gland indicated merely by the occurrence of fine granular cytoplasm without limiting cell walls, containing in its center from six to ten large vesicular nuclei. The connective tissue in this region is infiltrated with a compact aggregation of lymphoid cells, plasma cells, endothelial cells, with here and there a giant cell. In the center of the infiltrated regions are numerous areas of necrosis with irregularly divided outlines, in many places coalescing with each other. In these necrosed areas there are no infiltrating cells visible, but here and there a giant cell, often more or less disintegrated. These necrosed areas are situated chiefly in the deeper portions of the tissue near the cut surface.

The patient was given mercury and iodid of potash with the result of a prompt diminution in the size of the swelling in the right side. The septum healed over in a few weeks leaving a smooth surface, although the ulceration in the right lower turbinate lasted for several months, finally healing after the exfoliation of a small bony sequestrum.

Examination of the patient three months later showed a smooth mucous membrane covering the septum on both sides and giving no indication of a previous inflammatory process beyond a small white scar corresponding to the point where the specimen had been removed for microscopic examination.

Case 3. The patient, a young man 25 years of age, came to the throat clinic at the Massachusetts General Hospital, complaining of occlusion of the right nostril of several weeks duration.

Examination showed a reddish, rounded swelling, situated in the center of the quadrangular cartilage about the size of a split pea, covered with a smooth mucous membrane except toward the center, where a limited area of ulceration was evident. The whole mass was excised, together with a portion of the adjacent mucous membrane.

Histologic examination of the mass showed it to consist of a collection of infiltrating cells, surrounded by essentially normal mucous membrane. Proceeding from the former, in the direction of the tumor, we find the periphery of the latter to be marked by an infiltration, chiefly of lymphoid and plasma cells in the connective tissue, below the mucous membrane, particularly about the glands. With these there are associated a varying number of mast-zellen, which are, however, nowhere numerous. At the periphery of the infiltration, there is evident also a proliferation of endothelial cells of the blood vessels, which appear in places to present a thickening of their intima. The mucous glands about the margin of the infiltration show proliferation of their cells, and are filled with mucus. In the infiltrated are a, the lumen of the gland is compressed, the cells are in active, and show no secretion of mucus. As the infiltration becomes more dense, the glands appear correspondingly diminished in size from pressure of the surrounding cells. Toward the center of the infiltration, the character of the cells change, polynuclear leucocytes appearing, the plasma cells and lymphoid cells becoming less abundant. Fragmentation of the nuclei of the endothelial and glandular cells appears, and becomes gradually more pronounced. The center of the mass itself is made up of necrotic cells, appearing as amorphous detritus, and nuclear fragments of varying size. The epithelium covering the tumor is of the columnar ciliated type, which shows a marked infiltration and as the center is approached it becomes exfoliated in irregular masses leaving the bare connective, tissue, with its infiltrating cells. At the central ulceration, the necrotic area reaches the surface, for a short distance, and amorphous detritus is seen to be making its exit through the uppermost cell layers.

3. Granulomatous Growths Arising from the Anterior Septal Mucous Membrane.

CASE 4. The patient, a married woman 35 years of age, was refered to me by Dr. Prevaux of Haverhill. Examination showed extensive irregular ulcerations with cicatricial deformities over the hard palate and pharynx. A soft, friable, grayish-red mass with broad pedicle was situated on the left side of the septum anteriorly. The mass was excised close to the cartilage, which exhibited no loss or perceptible thinning at any point. The patient was put on mercury and iodid of potassium, with the result that the ulcerations in the throat rapidly improved.

Histologic examination showed the excised mass to consist essentially of granulation tissue, covered irregularly by mucous membrane. In the deeper portions of the mass there is an active proliferation of the connective tissue and of the endothelial cells of the part. There are numerous large thin-walled blood vessels, which show a marked proliferation of their endothelial lining. Scattered about in this region are a few giant cells surrounded by a heap of endothelial and epithelioid cells. Toward the periphery of the growth the blood vessels become numerous and exhibit more or less thickening of their adventitia. In places the vessels are dilated, forming large irregular sinuses. The proliferation of the endothelial and connective tissue cells is here more marked than in the deeper portions. The epithelium is extremely irregular in its distribution, being in places absent, in others greatly thickened, sending down long irregular interpapillary prolongations composed of actively proliferating cells. The meshes of the epithelium are more or less widely dilated, and contain numerous lymphoid and plasma cells and polynuclear leucocytes. No glands were found in the specimen.

It is evident that we have to do in this case with an active proliferation of the endothelial cells and of the connective tissue, which is traversed by numerous new-formed blood vessels. Giant cells, and aggregations of epithelioid cells are comparatively few, and there is nowhere evident a formation of typical miliary tubercles. The histologic diagnosis is therefore syphilitic granuloma.

CASE 5. The patient was a married woman about 35 years of age, with negative previous history, who presented herself for a blocking of the left nostril of several weeks duration. The throat had been sore for several weeks previously, and had been treated by her physician with local applications of iodid of potash internally without effect.

Examination showed the posterior pharyngeal wall to be covered with a broad, irregular, shallow ulcer, with slightly elevated, undermined margins, and a granular floor, which in places appeared irregularly wrinkled and contracted. The right nostril presented a moderate deviation of the septum. On the left side of the septum anteriorly there was a short, rounded reddish mass, about one centimeter in transverse diameter, with a granular, easily bleeding surface, attached by a broad pedicle. This was removed and examined microscopically.

Histologic examination of the specimen removed from the septum showed it to consist chiefly of a reticulum of fibrous tissue, moderately vascular, containing numerous round cells, and covered by stratefied pavement epithelium. The epithelium is in places deficient, in others, peculiar in thickness and distribution. Over a portion of the mass, the mucous membrane is thick and compact, consisting of 10 to 20 layers of epithelial cells, with well developed papilli. In other places, it is reduced to three or four layers of loosely coherent epithelial cells. Below the mucous membrane, the connective seems to be traversed by numerous thin-walled blood vessels. The connective tissue exhibits a marked proliferation of its cells, which are evenly distributed throughout the whole area. There is also a proliferation of the endothelial cells of the blood vessels, but these are nowhere aggregated into groups. In the meshes of the connective tissue there are lymphoid cells and plasma cells, more or less evenly distributed throughout the whole area. The interpapillary prolongations of the epithelium in places extend downward for a considerable distance from the surface, and the individual epithelial cells show an active mitosis.

No giant cells or glands are found in the tissue.

The tissue thus seems to consist essentially of actively proliferating connective tissue, supplied with thin-walled blood vessels and covered with proliferating pavement epithelium.

There is no evidence of central softening in the tumor.

4. Excoriations and Scars occurring in Syphilitic Individuals.

Case 6. The patient, a man 50 years of age, was seen for blocking of the nose, due to the accumulation of dry crusts on the mucous membrane of the septum, which had been troubling him for eight or ten years. The patient admitted the possibility of an old syphilitic infection, but was unable to give definite details in regard to characteristic symptoms.

Examination of the nose showed a general thickening of the septum, with an irregular, granular area, on the left side, from which a large firmly adherent crust was removed with difficulty, The cartilaginous septum as a whole, presented an irregular thickening, with suggestions in the vicinity of the excoriation of irregular scar formation. From the patient's general symptoms, a diagnosis of probable late syphilis was made. Dr. Pfaff, who saw the patient subsequently, for symptoms of gastric disturbance made independently also a diagnosis of late syphilis. The patient was given iodid of potash, which relieved promptly his headache, and general depression. Four months later, examination of the nose showed a noticeable diminution in the extent of the excoriation, although the crusts continued to form to a moderate extent.

Case 7. The patient, a man 35 years of age, came for a crust formation on the left side of the septum, which had troubled him for 5 or 6 years The probability of an old syphilitic infection was admitted, but no definite history elicited.

Examination of the nose showed a slight general thickening of the cartilaginous septum, particularly on the left side. Anteriorly, an oval, irregularly outlined area was seen, which exhibited a rough granular floor, surrounded by mucous membrane, of normal appearance. The floor of the ulceration was apparently composed of the perichondrium of the septum, which exhibited no thinning at this point, with here and there irregular strands and islands of cicatric al tissue extending from the periphery.

The cases described under the first two headings, namely, superficial and deep gummatous infiltration, represent well defined and well-known types of syphilitic infection. They correspond to the cutaneous and subcutaneous gumma respectively. In the first class, the infiltration is superficial, and epithelial necrosis occurs early. In the second group, the infiltration begins in the sub-mucous tissue, and a tumor of considerable size is formed, covered by a smooth mucous membrane, which only later exhibits ulceration. In none of these cases, was an invasion of the cartilage observed of any extent, and we must therefore consider that the perichondrium was only secondarily affected. It is thus not necessary that a perforation of the cartilage should occur in these cases, and healing would naturally take place, with the formation of a cicatrix in the mucous membrane.

We come now to the consideration of two conditions of more doubtful nature, namely, granulomatous growths, and excoriations and scars of the septal cartilage, occurring in syphilitic individuals.

In order to understand these conditions, we must bear in mind certain facts in connection with the portion of cartilage under consideration. This region is particularly exposed to irritations and injury, both from the facility with which it can be reached, and also from the fact that it is the first portion of the mucous membrane to receive the incoming current of air.

Examination of the interior of the nose, after the inspiration of air, in which a powder of conspicuous color, such as compound stearate of zinc is suspended, shows a sharply circumscribed deposit over the anterior portion of the quadrangular cartilage, about two millmeters behind the columnar cartilage, and immediately above its junction with the vomer. Constant living in a dry atmosphere must result in a considerable loss of moisture from the epithelium over this area, and it is thus easy to see that injuries here would be repaired with greater difficulty than in a more sheltered spot. This region corresponds to the situation of the origin of Jacobson, and joins immediately the so-called Schiefferdecker's transitional zone, namely, that portion of the septum where pavement epithelium is still present. Individual variations exist here to so great an extent, that it is difficult to set up a normal type. Thus the organ of Jacobson, which is fairly constant in animals and in the human embryo, but is usually rudimentary in the human adult, and discoverable only microscopically, may at times, be conspicuous, as in a recent case, which came under my observation. Here it occurred on the concavity of a septal deviation, in a man forty years of age, as a soft, rounded, swelling, about the size and shape of a small split pea, with an opening admitting a fine probe for a distance of three millimeters.

On the other hand, the columnar, ciliated epithelium, which normally exists here, may be replaced by pavement epithelium, with the production of a so-called dry anterior rhinitis. This condition has been investigated by Ribary, and is found to consist in an extension of the pavement epithelium from the transitional zone, with atrophy of the underlying mucous glands and adenoid tissue. This condition is a most important etiologic factor in habitual nosebleed, and in perforating ulcer. Ribary believes that the erosions which occur in this condition, may at time, give rise to polyp-like excrescences, as the result of a proliferation of the mucous membrane, leading to the formation of the so-called bleeding polyp of the septum. Local tubercular infection may occur in this situation, giving rise to the formation of ulcers and tumors. In syphilis, granulomatous excrescences may arise at this portion of the septum, resembling closely a tubercular granuloma. Their differential diagnosis is often extremely difficult. Such syphilitic granulomata, or syphilomata (Kuttner), in structure and arrangement, stand nearest to the gummata. This similarity is the more striking in the younger stages of both conditions. In both cases, the process begins with circumscribed aggregations of cells in the deeper portions of the tissue, and it is not possible at this stage to determine the ultimate result. Gradually through the swelling of the deeply seated tumor, the mucous membrane is forced out towards the interior of the nasal cavity. While however, the mucous membrane in the case of a gumma is raised in a hill-like fashion above the normal level, the granuloma shows a swelling far above the original level, and may even become pedunculated. In this stage their differences become marked. In the gummata, the component elements show a very slight vitality. Only in a few places are the unstable round cells transformed into the more stable and permanent form of spindle cells, and thence into permanent connective tissue. Much more frequently we see retrograde metamorphosis and disintegration. In the syphilitic granulomata, degenerative appearances may be found, particularly obliterative endarteritis, toward the periphery, but nowhere a central necrosis and softening.

The histologic separation of these syphilitic granulomata from those of tubercular origin is not always easy. In general, the microscopic appearances are similar, the chief points of distinction being as follows.

Syphilis.	**Tuberculosis.**
Numerous new-formed blood vessels among the proliferating endothelial and connective tissue cells.	Few new-formed blood vessels, among the proliferating endothelial and connective tissue cells.
Giant cells and aggregations of epithelioid cells few.	Giant cells and aggregations of epithelioid cells numerous.

The peculiar excoriations and scars found in cases 6 and 7, could not be referred with certainty to syphilis, yet they presented certain characteristic points of distinction from the ordinary lesions due to simple trauma and secondary pyogenic invasion. These features are a rough granular floor, irregularly traversed by cicatricial mucous membrane, the whole area being surrounded by a dentate or sinuous border of normal mucous membrane. These appearances suggest an antecedent ulcerative process, which has shown a tendency to irregular progression and regression, rather than a traumatic lesion, affecting the whole of a given area simultaneously.

It is, of course, impossible to exclude other causes of ulceration than syphilis, and the material at hand is as yet too small to justify definite conclusions, in regard to the nature of the process. Nevertheless, in view of the course and mode of healing of superficial, tertiary syphilis elsewhere in the mucous membranes, the possibility is at least suggested in the two cases reported, that these lesions are the result of antecedent superficial gummatous infiltration. The cases are reported for the purpose of directing attention to the possibility of a syphilitic origin in a certain number of cases of septal excoriations and scars

III

A CASE OF INFECTIVE THROMBOSIS OF THE LATERAL AND SIGMOID SINUSES.*

BY

EWING W. DAY, M. D.,

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Frank R., eleven years of age. His mother thinks he had earache during teething, but insists that he has had no ear pain nor discharge during the last seven years until three weeks before admission, when, during an attack of "cold in the head," he complained of aching in the right ear, followed by slight discharge which ceased in a few days. Since this the boy had not been well, complained of feeling tired, lost flesh, had fever on some days, none on others. Though he had distaste for food, there was no nausea, no vomiting, no chills, no sweats, no headache, no vertigo,.no pain back of the ear. The bowels had been somewhat costive.

On admission the boy was pale, emaciated, and had an appearance of general toxemia. His expression was not anxious, his mind was active and unimpaired, tongue somewhat coated, breath not offensive, glands normal, urine negative, nose, throat and lungs negative. Pulse 120, temperature 104, respiration 30. He was somewhat somnolent, irritable when aroused for medicine or thermometry, but when awake perfectly clear mentally, and, when asked, answered that he felt well and had no pain anywhere. Ear examination showed a little pus in the canal, slightly greenish in color, not fetid, and a small perforation in Shrapnell's membrane occluded by a plug of cheesy pus. The postero-superior wall sagged slightly, there was no mastoid tenderness, no edema over mastoid or emissary vein, nor in the upper posterior cervical triangle, nor over the internal jugular vein.

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*Read before the meeting of the Middle Section of the American Laryngological, Rhinological and Otological Society, Pittsburg, Feb. 22, 1904.

Eye examination by Dr. Curry negative.

The classical Schwartze operation was done in the usual way by Dr. Milligan. The mastoid cells were normal and no pus or pathologic material was found until the antrum was reached. It contained a few drops of thick pus which was evacuated. The swollen membraneous lining was curetted, the occluded aditus thoroughly cleaned out, and a free return flow of posteriorly injected fluid obtained. The tegmen tympani and tegmen antri were probed in search of erosive defects, but none was found. As the cells toward the tip and toward the sinus were absolutely normal, it was decided not to explore further, though it was recognized that sufficient pus had not been found to account for a temperature of 104. Yet, as this operation was being done on the day of admission, previous to which there were no systematic temperature and pulse records, it was deemed best to defer further exploration until a temperature chart and further observations could be obtained.

For the four following days his symptom-complex consisted practically of emaciation with a temperature ranging from 97 to 104, with a daily rise and a daily fall, the rise without a chill and the fall without a sweat. The pulse ranged from 90 to 120, the respiration from 22 to 34.

There were absolutely no other symptoms of any kind, no chills, no sweats, nausea, vertigo nor headache. Dr. Koenig and Dr. Burt saw the case in consultation and found nothing but a slightly enlarged liver, which, however, was not tender. Quinine up to 16 grains daily had no influence on the intermittent temperature. In consultation it was decided best, in the absence of other discoverable cause, to explore the sinus.

The mastoid wound was found healthy and was beginning to granulate. The scalp incision was extended backward, and it was noticed that when the periosteal elevator cut off the mastoid emissary, a drop of pus oozed from the cut vein. The rongeur rapidly enlarged the bony wound backward. No osseous erosion was discovered, no granulation tissue, no pus. The bone was everywhere perfectly healthy, though the cranial surface of the bone, as noticed when a rongeur chip was turned over, was darkened slightly where it had lain in contact with the sinus. A vertical inch of the sinus laid bare was found to be free from granulations or extra-dural pus; on palpation it seemed thickened, though its contents were certainly not solid. An incision three-fourths of an inch in length evacuated a stream of greenish fluid pus and cheesy debris. The sinus was cleared to the jugular bulb, but no return flow of blood was obtained. Before proceeding further it was decided to ligate the internal jugular vein, and an incision was made in the neck over the course of the vein from the level of the mastoid tip to the clavicle and the vein rapidly exposed. It was found collapsed, though some blood was coming into it from the facial. After the facial was tied off, and we were about to pass the ligature, the vein began to fill. It was quickly passed and the ligature was tied just above the clavicle, after which the vein slowly filled until enormously distended. No branches other than the facial and thyroid were found, so two ligatures were tied as close up to the bulb as possible and the vein cut between and removed. The contents of the exsected portion of the vein were afterwards examined. A few minute clots infected with streptococci were found adherent to the intima, but, of course, there was no thrombus. The neck wound was closed and protected while we returned to the sinus. I rapidly enlarged the bony wound backward to the external occipital protuberance, slitting the sinus with small probe-pointed scissors and curetting as far as the curve of the sinus permitted, until the torcular was reached. Here the curette at last brought red blood clot, followed by a good flow of blood. The other end was then cleared to the jugular bulb. There was no flow from the superior or inferior petrosal, in fact no blood nor red clot from anywhere, only fluid and cheesy pus and debris. The cranial wall of the sinus, while thickened, did not seem softened, and minute examination did not reveal a fistula at any point. The entire lateral and sigmoid sinuses were cleaned out thoroughly, irrigated with bichlorid solution, dusted with iodoform, the entire wound was packed with iodoform gauze and a few sutures were used to approximate partially the external wound.

The operation lasted about two hours, almost no anesthetic being necessary during the last hour. Shock was severe. The pulse was 160 and had become very weak and thready, the breathing rapid and shallow. A total of 1/10 of a grain of strychnin sulphate had been given during the operation. An enema of salt solution was given and preparations for an intravenous saline made. The enema and oxygen, however, soon rallied the pulse and respirations above the danger point.

The post operative rise of temperature did not exceed 102°. The wound was dressed at the end of a week and found to be clean and granulation processes proceeding satisfactorily.

Convalescence was established, and the boy gained in weight, seemed bright, ate heartily, and the temperature was normal. About the third week after the operation the temperature rose to 103, fell to nearly normal, rose again as high as 104; and continued to fluctuate in this manner for a week, with an occasional sweat but no chill, and without any symptoms localizing a pus focus elsewhere than in the head, yet I could not bring myself to believe there was any further pyogenic intracranial extension; and, the wound, being clean, healthy and granulating rapidly, could not cause the irregular temperature. After a week of this, he began to complain of pain in the right iliac fossa, where a mass was found to be forming. The right thigh became semiflexed, an effort of extension eliciting pain. The veins of the right side of the abdomen became distended and showed out strongly as compared with the opposite side. The patient was for this condition transferred to the West Penn Hospital under the care of Dr. Macfarlane, who cut down upon the mass and found that it surrounded the iliac artery and vein. It seemed extra-peritoneal, though its extent was not explored and the abdominal wound was closed without any attempt at removal. The recovery was perfect and complete; the boy is now in the best of health. A microscopic examination of a specimen of the abdominal mass removed at the abdominal exploratory operation showed it to be inflammatory glandular tissue, and Dr. Macfarlane could suggest no pathologic relation between it and either the otitic or the intracranial condition.

This case presents a number of peculiarities worthy of study.

First, the very slight ear symptoms, consisting of an earache in a previous healthy ear, lasting a day or two, ending in a discharge which soon ceased.

Second, a diagnosis solely on emaciation, the temperature chart, and exclusion.

Third, infective sigmoid and lateral sinus thrombosis without any disease of the mastoid cells, being evidently an infection not by direct extension nor osseous erosion, but by infective thrombosis of the minute veins passing into the superior petrosal and sigmoid sinuses from the middle ear. The thrombosis extended downward to the bulb; but evidently the clot about the inferior petrosal orifice was not yet firm, giving way and partially filling the collapsed jugular after the facial was tied off.

Fourth, an intercurrent abdominal condition with pyemic symptoms simulating those of intracranial pyogenic extension.

IV

LARYNGEAL STENOSIS FROM POST-TYPHOID PERICHONDRITIS, TRACHEOTOMY, THYROTOMY, INTUBATION.—EXHIBITION OF TWO PATIENTS.*

By Ewing W. Day, M. D.,

and

Chevalier Jackson, M. D.,

PITTSBURGH, PA.

Case 1.—A. Di M., laborer, Italian, aged 22, was admitted to the service of Dr. John W. Boyce in the West Penn Hospital, for typhoid fever, in about the second week of the disease. Following the rule in the hospital he was sponged with cold water every time the temperature crossed 103. In spite of faithfully applied hydrotherapy, the temperature would often shoot up to 105. Some days, as many as ten spongings in 24 hours were necessary. This is mentioned to show the severity of the typhoid. At the end of the fourth week the temperature touched normal, and convalescence was established in the fifth week. In the sixth week some hoarseness developed, accompanied by dysphagia and some swelling and tenderness externally over the larynx. Dr. Day was called to see the case at this stage and found the patient slightly cyanotic, with a mild inspiratory dyspnea. On laryngoscopic examination, the epiglottis and arytenoids were found to be swollen into three edematous, rounded masses, and all landmarks obliterated. His diagnosis was edema of the larynx from perichondritis of the thyroid, arytenoid and epiglottidean cartlages. Though he had little faith in the value of intubation in such cases, he deemed it worthy of a trial, but found the symptoms unrelieved by a tube. Free scarification of the larynx evacuated a quantity of serum with temporary relief. He left instructions, that if the symptoms should increase, a tracheotomy should be done. The symptoms increasing during the night, Dr MacFarlane opened the trachea. Dr Boyce, who was present, states that the symptoms had not been urgent, but while preparations for operation were being made, he turned around and saw that the patient was black in the face and had ceased to breathe. His opinion is that typhoid patients often die in this manner in the absence of a physician, without the immediate cause of death being suspected. Be this at it may, our experience in the examination of the larynges of 280 typhoid cases, shows laryngitis in 40 per cent., ulceration in 11 per cent., perichondritis in 4 per cent. A detailed report of these examinations will be the subject of a future paper.

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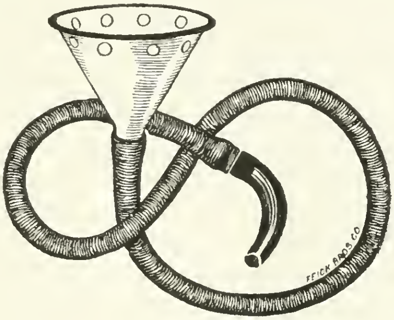
*Read before the Meeting of the Middle Section of the American Laryngological, Rhinological and Otological Society, Pittsburgh, Feb. 22, 1904.

The inflammatory symptoms associated with the perichondritis subsided in about ten days. The patient on one occasion withdrew the outer tracheal canula, immediately became cyanotic and nearly expired of asphyxia before he was discovered and the interne arrived to replace it. Later, when the tube was withdrawn, it was found that only a small amount of air could pass the larynx, deep cyanosis immediately setting in. Sufficient air passed for a rough, rattling phonation. In this condition he was turned over to us to see if the tracheal canula with its attendant inconvenience and dangers could be done away with. Upon laryngoscopic examination, the vocal cords were found obliterated, their place being taken by thickened, rounded masses of apparently thickened infiltrated and cicatricial tissue, the left mass being larger than the right. A narrow slit about one-eighth of an inch long and of no appreciable width was apparent on forced expiration with the tracheal canula closed with the finger. Through this, evidently, phonation, such as it was, was produced.

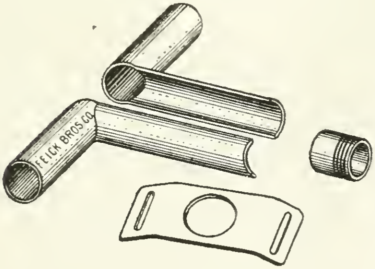
Under cocain anesthesia, this slot was dilated with first a number 4 (American) male catheter, gradually increasing to a number 15. This was followed by the smallest Schroetter's laryngeal bougie, which was, however, the limit of dilation. Larger sizes could not be passed without more force than was deemed wise. No improvement, whatever, was obtained from two months of this treatment, the tissues resuming their swollen condition immediately after dilation and no useful amount of air could pass. A specially made intubation tube of adult length and as large in diameter as could be passed without violence, gave no useful amount of air. Divulsion with McKenzie's laryngeal forceps was next tried, with no better results, and with considerable inflammatory reaction.

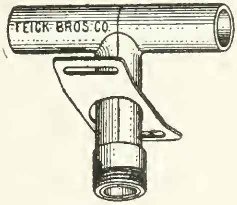
On August 26, 1903, under chloroform anesthesia, we split the thyroid and cricoid cartilages down to the tracheotomy wound, retracting well with small sharp retractors. The interior of the larynx was found filled with cicatricial and infiltrated tissue, the cords obliterated, and only the arytenoids remaining of the landmarks. With curved scissors, the entire contents of the larynx down to the thyroid perichondrium was clipped out, leaving the aryepiglottic folds, and the remnants of the arytenoids undisturbed. A large mass of granulation tissue on the back wall of the trachea at the site of the fenestrum of the trachea canula was also clipped away. The canula was replaced and the larynx packed with an iodoform gauze strip, to the far end of which catgut was attached to make counter traction on the packing to prevent its working out and down the esophagus.

We then devised a tracheal canula that would extend upward as well as downward, so as to keep the laryngeal lumen patulous until the cavity was at least partly lined with epithelium. This was worn for about a month, taking out daily for cleansing. Then a large sized aluminum intubation tube was made and inserted, and the patient put upon a strict liquid diet. Imagine our astonishment the next day, on removing the tube, when he vomited great masses of meat, potatoes, beets and other vegetables only partly masticated. Evidently the presence of this enormous tube did not interfere with deglutition. The tube reached below the old tracheotomy wound which was now allowed to close. For two months the tube was worn with perfect comfort, the patient serving as orderly in the wards. The voice, of course, was only a loud whisper.



On November 19, the tube was removed, and was followed by a gradually increasing dyspnea for six hours, due to reactionary engorgement of the mucosa, previously subjected to pressure. After the sixth hour the dyspnea grew less and less, the swelling went down, and the patient is now comfortable and going about his work as well as ever.





As to voice, he has as much as he had at any time since his trouble began. That is, he converses in a loud whisper, and there is good hope that an adventitious fold of mucous membrane will some day yield him a certain degree of phonation.

CASE 2. Elias Shokowsky, a Galician, 25 years of age was admitted to the West Penn Hospital in the service of Dr. Litchfield, on August 8, 1903, for typhoid fever. The temperature on admission was 104° F. Next day the maximum was 105. For three weeks it could be only kept within bounds by ice packs, several times daily, in spite of which 105.4 is recorded in many places on his chart. At the end of the 4th week in the house, about the 6th week of the disease, the normal was reached. In the 3rd week double acute purulent otitis media developed, pouring out a stream of purulent sanguinous serum amounting to 2 or 3 ounces daily. Later, the pus changed to a thick creamy character, though very abundant. On the 45th day, the temperature which had been normal began to rise to 99°, sometimes 100°. However, no symptoms of mastoid involvement were present, other than the rise of temperature, which is common in typhoid without purulent complications. A diagnosis of mastoid empyema was made and the mastoid opened. The mastoid cells were broken down by necrosis, and filled with pus, granulation tissue, and necrotic debris. Nothing was noted of a very different nature from many other similar cases complicating typhoid. The course was uneventful and the wound has now healed.

In the third week of the typhoid, a double pneumonia developed, ran a ten days course and subsided. In the fourth week a laryngitis developed with spots of sloughing, followed by ulceration at the anterior commissure, on the left false cord, on the right arytenoid, and on the left half of the under surface of the epiglottis. There was a slight edema, but no cyanosis or dyspnea, though he was watched closely. He had a slight odynphagia, but no dysphagia. There were a slight aching and considerable tenderness not only in the larynx but down the trachea as far as palpable.

About a week after the mastoidectomy, the temperature which had been about normal since the post-operative rise, began to fluctuate, rising to 101 and falling to normal. The deepening laryngeal ulceration had reached the cartilage, which was rapidly breaking down, from which the larynx was constantly filling with pus, edema began to develop and on the 65th day of the typhoid, the 37th day of the laryngitis, cyanosis and dyspnea necessitated a tracheotomy which we did. A vertical inch of the trachea was slit open to permit of free inspection. The mucous membrane was found ulcerated in spots and so edematous that only a child's size tracheal canula could be inserted. The 2nd, 3rd and 5th cartilages were found thickened and evidently inflamed, though actual necrosis could not be made out. On palpation externally on the skin surface, no rings could be felt, owing to the intercartilaginous swelling.

The day following the temperature shot up to 104 and pneumonia was feared, but the next day the temperature fell to 99°, ranging from this to 100° for a few days, plainly due to the chondritis and perichondritis. After the tracheatomy, the repose of the larynx seemed to bring about a prompt resolution of the laryngeal disease. Both the edema and the inflammatory symptoms all subsided and in five weeks the ulcerations had all healed and the mucous membrane was in a healthy state. There remained, however, a complete laryngeal stenosis due to:

1st—Abductor paresis.

2nd—Ankylosis of both crico-arytenoid articulations.

3rd—Cicatricial bands uniting the false cords.

4th—Cicatricial hyperplasia narrowing the chink to a pinhole.

The voice was totally lost; lip motions, with a puff of air from collapsing his cheeks, being the only attempt at speaking.

The typhoid and its complications had left his health shattered, so that it was deemed best to delay operative work looking to the abandonment of the trachea tube until there would be less likelihood of cartilaginous necrosis and slow cicatrization, with their vicious tendencies to stenosis. This favorable period was not quite reached, as the wearing of a trachea tube, with its attendant discomforts, cough and pus formation, is not conducive to perfect health.

On January 22nd, 1904, just one month ago, it was deemed advisable not to wait longer. The larynx was split open by an incision through the thyroid cartilage, the two halves of which were widely separated by small sharp retractors, and the interior of the larynx swabbed freely with

1:1000 adrenlin and 20 per cent. cocain solutions. The operation was carried out about as in the previous case; a combination of the Trendelenberg and the Rose position was relied upon to keep the blood out of the trachea. How well it served the purpose is shown by the total absence of lung symptoms in both these cases. The chloroform was administered through a gauze covered funnel connected by a soft rubber tube to a curved hard rubber tube which was inserted in first the trachea tube; then, later, when the incision was extended down to the tracheotomy wound, the hard rubber tube was held in the trachea at the lower angle of the wound. The Trendelenberg tampon canula is in our opinion, too much in the way for convenient work in thyrotomy, and the tampon is needless if the position be properly maintained. Gravity is better than the tracheal tampon.

After the operation, the Day-Jackson larynx-trachea tube was inserted, the thyroid cartilage brought together by catgut sutures, a little silkworm gut drainage inserted and the skin wound brought closely in apposition down close to the stem of the tube around which a little iodoform gauze was packed. The post-operative rise was to 100°, after which it remained about normal. The tube was taken out daily for cleansing. The diet was liquid for two days, then light solids. No difficulty was experienced in swallowing as the upper arm of the tube was arranged to just reach to the base of the epiglottis, which closed it tightly during deglutition. The neck wound healed down to the trachea tube by first intention, and healing of the mucous surface in the interior proceeded rapidly. At the end of two weeks it had proceeded sufficiently far for the insertion of the large aluminum intubation tube, which has been in ever since. At first he rather hysterically claimed he could not swallow even in the Casselberry position, so we procured an infant's nursing bottle filled with milk. The mirth and jibes of the other patients at sight of this aroused his ire to such an extent that he grabbed up the bowl of milk that he had claimed he could not drink, and he swallowed the whole of its contents without removing it from his lips. Since this there has been no trouble in feeding.

The external wound has entirely healed and he is now going about the ward in better health than before the operation and is steadily gaining in vigor since the abandonment of the trachea tube. The intubation tube causes him no discomfort and his whispered voice is now good, whereas before the thyrotomy he had no voice at all.

The question might be asked, why not insert the intubation tube at once after the thyrotomy. The objections are:

First—That edema of the epiglottis and of the ary-epiglottic region followed the operation in both these cases. It was not great but might have led to some obstruction by puffing over the upper end of the tube.

Second.—The mucous membrane is less subjected to pressure during the post-operative swelling by the T-shaped tube.

Third.—The mucous membrane can be inspected and treated at the daily cleansing of the tube.

Fourth.—There is a strong tendency to the formation of a hyperplastic node on the posterior tracheal wall from the prolonged wearing of the ordinary curved trachea tube, which of course, is always (and rightly) used after tracheotomy. This is best combated by the Day Jackson tube with its straight "run" and with, if deemed necessary, the application of medicaments, if there be any tendency to exuberant granulations.

Fifth.—If cartilaginous necrosis should occur it can be seen and combated early, without endangering either the life of the patient or the success of the operation.

Sixth.—Drainage, which is very essential, especially during the first two weeks, is best accomplished by the T-shaped tube with a litttle strip of iodoform gauze packed around the stem.

Seventh.—With this tube and drainage not only is there no danger of pus reaching the lungs, but the cough, which of course is the final safeguard, is very much less; so that the parts get more rest and heal more steadily.

The enormous size of the intubation tubes is, we think necssary to insure the largest possible lumen in the healed larynx. Of course, its size is exctly adapted to the case, so that no undue pressure on the cartilage is exerted. Aluminum is the only available material of which to make them.

Any other metal would be too heavy for so large a tube, while hard rubber would not have necessary strength if made as thin as is desirable. The only drawbacks to the aluminum tubes are that both boiling and bichlorid solutions roughen the surface, and the softness of the metal renders it especially liable to scratches and mutilation, which of course, must be polished off again to prevent the formation of abrasions and ulcerations of the mucous surface. The shape differs from the ordinary O'Dwyer tube in having a large inter-arytenoid swell on the head, which is necessary to retain the tube in the absence of all endolaryngeal structures. The neck of the tube also is proportionately thicker than the O'Dwyer tube. This must not be construed as a criticism of the O'Dwyer tubes, which are perfect, but they are of course, intended for the entire larynx, while here we have the eviscerated larynx to intubate. The first tube inserted in the first case while large at inter-arytenoid swell was not sufficiently so, so that it slipped down far enough to allow the swollen ary-epiglottic folds to close over it. As the lower end of the tube extended below, and closed off, the tracheal wound, respiration was impossible, deep cyanosis set in, and if the tube had not been immediately pushed up by clasping it with a hemostat through the external wound, immediate asphyxia would have terminated the case

The T-shaped trachea tube is made of german silver. The size should be exactly adapted to the case both as to outside diameter and the length of the downward, but more especially the upward arm, which should just reach the base of the epiglottis, extending as high as can be closed by the epiglottis when it comes down in swallowing. The length will depend upon the vertical dimension of th thyroid cartilage, the position of the epiglottis (which not only varies but may be displaced and distorted in these cases), and on the position of the original tracheotomy wound, as it is desirable to bring the stem of the T-shaped tube out through the old wound. While the tube must not be so thick as to have an insufficient lumen, it must have sufficient thickness of metal not to lose its shape in the daily removal and cleansing, and to ensure a perfect fit, without a crevice, when brought together and the collar put on. A crevice would induce exuberant granulations. The edges of the upper and lower arms should be rounded and not too thin, to avoid injury of the mucous membrane in insertion. The tape holder is more for the purpose of retaining an iodoform drainage dressing than for retention of the tube and should have a large hole so as to not drag laterally upon the tube; to prevent which, it is well, also to seal down the tapes at the side of the neck with either collodion or adhesive strips. The daily, sometimes bi-daily, cleansings are necessary as the secretions dry and "gum" on the inner surface of the tube. The entire tube must be removed for this, as it is not possible to have an inner canula in this shaped tube. The daily removal has, however, the advantage of facilitating a close watch on the healing process. The tube is inserted, first the lower arm, then the upper, as the latter has more latitude of motion than the lower, which goes into the uncut tracheal rings of more or less rigid lumen. The lower arm going in first is readily slipped in with the fingers, while the upper arm may require the assistance of a long slender pointed hemostat clamped to the wall of its stem in the long axis. After placing, it is necessary to be sure that the flanges at the intersection of the upper and lower arms of the tube fit together perfectly, which will be shown by close contact of the two halves of the stem outside the wound, and the even edges at the stem orifice. Then, and not before, the collar should be slipped on. In removing the tube, after removal of the collar, the two halves of the tube will be found agglutinated tightly together by exsiccated secretions, so that they can only be separated by inserting a thin hemostat in the orifice and separating the blades. The upper tube is removed first, usually requiring only the fingers.

With regard to the ultimate outcome of these cases, the first patient is able to get along now without his intubation tube, and the second will be able to as soon as it is deemed advisable to take it out. The first case has had his tube out for a month at a time, when it was put in again, not on account of dyspnea, but because: first, it seemed advisable on the score of safety during an acute "cold" involving both nose and throat; second, it seems to us better to obtain the largest possible ultimate laryngeal lumen, a result to which prolonged intubation may conduce. But even if occasional or even interminable intubation were necessary or advisable in a given case, no laryngologist, and certainly no patient, would hesitate to choose the intubation tube in preference to the tracheal canula; first, on account of its safety from pulmonary risk, especially in going out of doors in cold and dusty weather; second, on account of its needing cleaning only once every month or two, if at all; third, on account of its enabling the use of the whispered voice, without blowing foul air from a tracheal wound into the listener's face, or the stopping of the canula with the fingers; fourth, except for the whispered voice, the patient goes about among his fellow-men without feeling like a freak of nature in breathing through a hole in his neck; fifth, a tracheal canula is a very annoying and uncomfortable thing to wear with its granulations, pus and constant nastiness, requiring a dressing that interferes with the wearing of a collar. An intubation tube after a few weeks becomes perfectly comfortable, the patient not being aware, from any sensation, that it is there—just as with artificial teeth; Sixth, and by no means the least important, is the matter of health. No patient can enjoy a full degree of health while wearing a tracheal canula, whereas an intubation tube is no detriment whatever. The first case wore a trachea canula of the usual curved form for six months, without ever feeling perfectly well. He was easily fatigued and would lie down on his bed for several hours a day. Three weeks after intubation, he was an active barber, and later on, an orderly on the wards, fit for full duty and has ever since enjoyed life as much as ever, his health in every way being perfect. The second case wore the ordinary curved tracheal canula for six months, during which he was feeble and in poor health. Now, after two weeks of intubation his health is better than at any time, and he will at the present rate soon be as robust as ever. In these considerations, the fact of these two cases being typhoid convalescents, is not overlooked, but compared to the hundreds of other typhoid convalescents oberved in the hospital, the detrimental influence of the canula on the health was readily noticed. As to danger of occlusion, we think an obstructed intubation tube could be coughed up. This happened once in case No, 1. Case two was in imminent danger of death from occlusion of the tracheal canula (the usual curved form) by granulations, which continued to obstruct after the tracheal canula had been removed by the nurse. The respiration had ceased when one of us arrived and removed the obstructing granulations which hung down over the trachea in the wound in a flap-like valve, which allowed expiration, but shut promptly any attempt at inspiration

V

CHOLESTEATOMATOUS DISEASE OF THE TONSILS.*

BY NORVAL H. PIERCE M. D.

CHICAGO.

If some may deem an apology necessary in introducing such a time-worn subject as the supratonsillar space which prefaces this paper, I shall plead at least a novel manner of treatment of the subject and that I believe new points are brought out for your consideration.

The supratonsillar fossa is an irregularly shaped cavity situated above the tonsil between the anterior and posterior pillars of the fauces. Its roof is supplied by the upper leaf of the soft palate; its floor by the tonsil and anterior and posterior pillars when they join the tonsils; its outer wall by the tonsillar fascia; and its inner wall by the anterior and posterior pillars and what has, as far as I am able to discover, not been described, a fold of mucous membrane which I shall denominate as the *plica triangularis superior*. The significance of this fold from pathologic therapeutic standpoints, will be dwelt on later.

It may well be called the *superior* triangular fold in distinction to the plica triangularis with which we are all familiar and which may now be designated the *plica triangularis inferior*. As the base of the plica inferior is attached to the anterior pillar, the base of the plica superior is attached to the posterior pillar and runs forward to be lost in the anterior pillar.

In order to examine the fold, and any examination of the throat is incomplete without a thorough exploration of this region, it is well to put it on the stretch, and this is best done by inserting a blunt tenaculum back of the anterior pillar and pulling it forward; and in this way, too, do we best expose the supratonsillar fossa. This fold varies in its development in different individuals. In some it is very well developed; in others, rudimentary. The largest fold that I have seen measured eight millimeters, the measurement having been taken in the horizontal direction where the base leaves the posterior pillar. It is made up of mucous membrane in which occasional muscle fibers are found, derived from the palatal muscles. On its inner surface we occasionally find lymphoid structure resembling tonsillar tissue.

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*Read before the Middle Section of the American Laryngological, Rhinological and Otological Society, Pittsburgh, Pa. Feb. 22, '04.

The shape of the supratonsillar fossa is very variable and irregular. Usually by means of a probe we find that the outer portion extends in two conical extremities posteriorly and anteriorly up for a considerable distance into the soft palate. The same may be said of its inner portion. The floor is supplied, as before mentioned, by the tonsil; lifting the plica triangularis superior, or turning out the tonsi from its fossa by means of a blunt tenaculum, we see in the so-called tonsillar helix, minute openings which correspond to the lacunae within the substance of the tonsil.

Farther outward is to be found a cavity which lies between the tonsillar substance proper and the tonsillar facia. This cavity is fairly constant in its occurrence, and, from a pathologic standpoint, is, to me, of great importance. This may be called the appendix of the supratonsillar fossa. It is not an enlarged lacuna, but is an anatomic space surrounded by epithelium derived from the mucous membrane of the supratonsillar space and which extends downward to a line drawn at the base of the tonsil or farther downward approaching the sinus pyriformis, where it ends in a blind extremity. It has a diameter varying from one to several millimeters. The supratonsillar fossa and its appendix are supplied by the tonsillar artery, or arteries, the tonsillar nerves, and the whole is covered by squamous epithelium.

Passing to the pathology of the supratonsillar fossa, I shall direct your attention to two conditions which are the most important and frequent in occurrence, namely, metaplasia of the epithelium and peritonsillar abscess. Metaplasia of the epithelium within the crypts of the tonsils may occur at any portion, but is not infrequent in the depths of what we have described as the appendix of the supratonsillar space. Frequently by exploring the dilated crypts emptying into the helix of the tonsil, we may find whitish, foul-smelling, waxy masses which are the result of the metaplastic process. These have been erroniously regarded as decomposed food which has become lodged in the lacunae. This process is not confined to the crypts of the tonsil, but may occur from the diseased epithelium of the supratonsillar walls themselves.

The pathologic process to which Siebenmann has given the name metaplasia, occurs in various portions of the body, namely, in the middle ear, the mastoid cells, the frontal sinus, the maxillary sinus, etc. In the mastoid cells and middle ear these masses are known under the name of cholesteatoma. *Macroscopically and microscopically I have found that the plugs from the tonsils, or supratonsillar space are indistinguishable from cholesteatoma of the ear except that the masses in the tonsils have no limiting membrane;* in fact, they are produced by the same causes—exfoliation of epithelium, fatty degeneration, and finally, decomposition of the mass.

As to what the ultimate cause of the disease is, that is, the cause which produces the exfoliation of the epithelium we are ignorant. Whether it is due to an invasion of the crypts by the epithelium of the tonsillar surface, I am undecided whether the metaplasia is due to a specific acid-forming bacterium which has the same staining reaction as the bacillus tuberculosis and which is probably constantly associated with cholesteatomatous disease, I cannot at this time aver, but the chronicity of the process is probably due, in part at least, to retention. As soon as one layer of epithelium is cast off the process of degeneration of the underlying surface epithelium is repeated, and thus layer by layer the plugs are formed. This excentric increase may produce pressure sufficient to cause pressure atrophy of the tonsillar tissue surrounding the walls of such cavities as are related, or if the tonsillar substance is invaded by pathogenic micro-organisms, hyperplasia of the tonsil parenchyma thus the tonsillar substance itself is increased, while the lacunae, or crypts of the tonsil, undergo dilatation. I believe this to be a frequent cause of tonsillar hyperplasia.

Here permit me to accentuate the importance of the pus ratonsilar appendix in this regard, inasmuch as this is a cavity which is frequently occupied by these malodorous plugs. In the removal of the tonsils we do not, by the ordinary methods include this cavity—indeed, I regard it as dangerous to cut outside this space, as it is in almost immediase contact with the fat which separates the tonsil from the tonsillar fascia; and this leads me to call your attention to the peculiarity of the blood supply of the tonsil.

If we remove the tonsil from its niche we come upon a hard, firm, fibrous fascia which sends septa inte the parenchyma of the organ. Immediately outside of this we find fasciculi of the musculus pterygo-pharyngeus and bucco-pharyngeus. Further out we may come to a space occupied by fat which is divided into a posterior and anterior portion by the musculus stylo-glossus and stylo-pharyngeus. The posterior portion accommodates the carotis internus, vena jugularis and the nervus vagus. The carotis externa and interna cannot be wounded in a tonsillotomy in which the incision is sagittal, but the majority of dangerous hemorrhages are in all probability due to the wounding of the tonsillar arteries at their point of egress through the tonsillar capsule. The arteria tonsillaris is derived from the arteria palatina ascendens, which on a level with the tonsil divides into two branches which penetrate the tonsil fascia and enter directly into the tonsil. A large branch is frequently sent to that portion which lies at the outer extremity of the supratonsillar space, but for the most part, the upper portion of the tonsil is relatively poorly supplied with blood.

The great danger then, in excision of the tonsil is the division of the tonsillar arteries as they emerge through the tonsillar fascia. When this is done the fascia does not permit them to retract nor contract, but holds them open and the blood pressure is sufficient to wash away any clot that may form until such blood pressure is greatly reduced by exsanguination. Demi, ("Ueber Gefassanomalien im Pharynx," Wiener klinisch Wochenschrift, 1901, No. 48) suggests that a number of profuse hemorrhages following tonsillotomy may be explained by the wounding of the arteria lingualis. That this artery does occasionally send a loop into the tonsillar niche directly outside of the fibrous tonsillar capsule, cannot be doubted.

My experience would lead me to believe that the majority of profuse hemorrhages after tonsillotomy are due to wounding the arteria tonsillaris (or its branches) at the point where it perforates the tonsillar fascia. In order to destroy the blind sinus which I have designated the appendix of the supratonsillar fossa I have had made a pair of scissors which I herewith present. After tonsillotomies I am in the habit of inserting one blade of the scissors into the sinus and dividing it. Care must be taken that the walls of the sinus are kept open. This is readily done by tearing apart any of the adhesions after the third day, which is accomplished with the blunt tenaculum; the surfaces are then painted with nitrate of silver fused on a copper probe. Especially is this important when we find on exploration that the sinus contains the foul-smelling plug above mentioned.

In several instances in singers, I have noticed that, notwithstanding the removal of the tonsils, laryngeal irritation continued until the slitting of the sinus was performed. Great benefit, in the majority of cases, followed immediately upon this procedure. Numerous instances of fetor ex ore yield only to this operation.

When this metaplasia affects the supratonsillar fossa, its permanent cure can only be effected by a removal of the entire upper pole of the tonsil. An adhesive process between the plica triangularis superior and the upper surface of the tonsil may change the supratonsillar fossa into a more or less closed cavity. I believe, from my observations, that this simple fact, together with the co-existance of cholesteatomatous disease, is the cause in the majority of instances, of peritonsillar abscesses. Surely peritonsillar abcesses are by far best reached through the supratonsillar fossa by merely separating the adhesions between the upper walls of the supratonsillar space and tonsil; not only are we more sure to find the pus in this location, but the danger from hemorrhage is rendered nil. I herewith present a little instrument which I have invented for the purpose of evacuating such abscesses. You will notice that the edges are blunt so that no hemorrhage is possible. The blades of the instrument are inserted outward, and somewhat upward, until the sense of touch conveys the impression of the instrument having entered the abcess cavity. The blades are then separated and the pus permitted to escape. Pressure on the tonsil will aid in the evacuation of the abscess while the instrument is held in place.

After the subsidence of the acute symptoms of peritonsillar abscess, it becomes imperitave to remove sufficient of the upper fold of the tonsil to allow the supratonsillar space to drain permanently. If the tonsils are enlarged sufficiently to warrant their excision, these are removed, but more important than the removal of the lower portion of the tonsil, is the excision of their upper poles by means of either the tonsillar punch, the scissors, or the probe pointed knife. I submit herewith an original instrument which has several advantages over many of the punches in use.

First, its strength; second, the shifting shaft which enables us to change the cutting blades from right to left.

After the upper pole has been removed, our attention should be directed to slitting the cavity which we, have designated the appendix of the sinus. Even after the most thorough exploration and operation, however, we will find recurrence of this cholesteatomatous disease of the tonsils in certain cases, and only by repeated destruction of the crypts in which recurrences take place may we hope for complete and permanent cure.

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VI.

OBSERVATIONS ON THE ACTION OF THE CRICO-THYROIDEUS AND THYRO-ARYTENOIDEUS INTERNUS.*

JORGEN MOELLER AND JOH. FRED. FISCHER.

All authors are agreed that the above named muscles are to be regarded as the muscles that produce the voice; but the theories as to how they act are subject to wide differences. Some authors ascribe the greatest influence in regulating the pitch to one of the above muscles, and some to the other.

The crico-thyroideus muscle has the power of bringing the cricoid and thyroid cartilages closer together. It is not, however, certain which cartilage should be regarded as the punctum fixum, nor is it determined whether the expression of the whole musical scale, in which the human voice is included can be explained entirely by the degree of contraction of this muscle. Most authors believe that the pitch is dependent on the degree of contraction of the crico-thyroideus; others, however, e. g., Ewald, claim that this muscle fixes the cartilages only in their common conditions, but is unable to approximate them as closely as would be necessary in assuming that it influenced the pitch to any degree.

In order to clear up this question, we have made use of the Roentgen rays, and after a number of experiments we were able to make a series of plates which completely showed the action of the crico-thyroideus.

The subject of our experiments was a 67 year old man, whose voice was normal. The Roentgen bulb was held to the right of the larynx, so that the focus was at the height of the space between the cricoid and thyroid cartilages, and in such a way that a perpendicular drawn from the focus to the sagittal plane of the body would strike the anterior border of the cricoid cartilage. The distance between the larynx and anticathode measured 45 cm., the time of exposure was 12-15 sec. The photographic plate (lumiere 7x9 cm) was enveloped in black paper and held as closely as possible to the right of the larynx and parallel to the sagittal plane.

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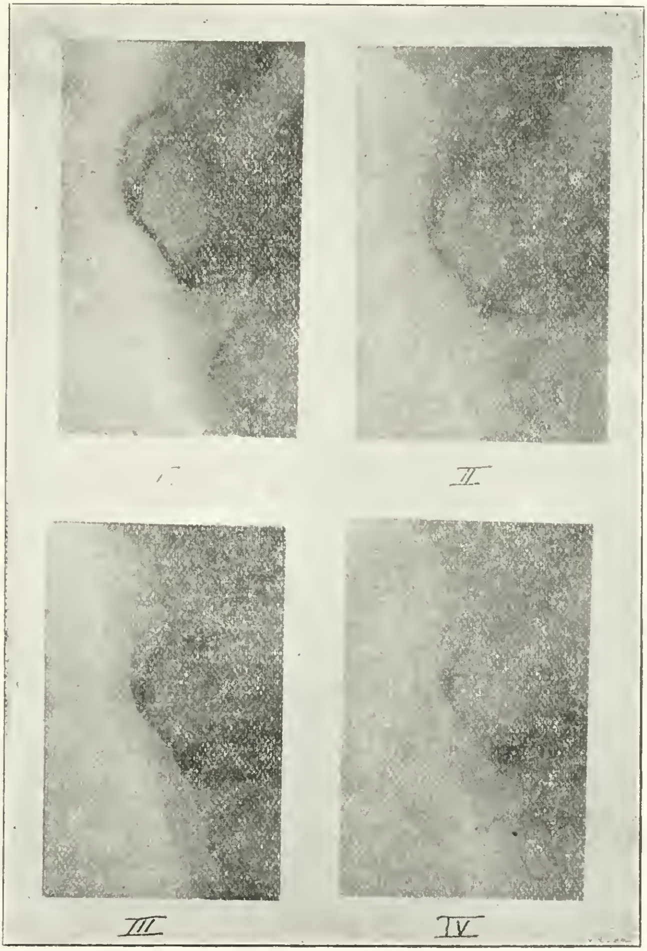
*Report from the Clinic for Diseases of the Ear, Nose and Throat in the General Hospital at Copenhagen, Prof. Holger Mygind, Chief.



During quiet respiration, the distance between the two cartilages anteriorly is 15 mm. (Fig 1); during intonation of the sound g it is only $7^{1}/_{2}$ mm. (Fig 4). In order to determine the influence of this change of position on the vocal bands, it will be necessary to glance a moment at the skeleton of the larynx. The axis around which the movement takes place, stretches between the two crico-thyroid articulations. If a line is drawn from this axis to the anterior and superior border of the cricoid cartilage, and another to the point of the processus vocalis (the arytenoid cartilages are regarded as fixed in relation to the cricoid) there is constructed an angle of nearly 90° whose horizontal side measures in an adult about 23 cm. and whose vertical side is about 16 cm. long; its length then is about $^{1}/_{3}$ of the horizontal. If this angle is rotated around its axis, it will be seen that the end point of the vertical side (the point of the processus vocalis) passes over $^{2}/_{3}$ of the path that the end point of the horizontal side (the anterior part of the cricoid cartilage) traverses. Now if the distance between the cricoid and thyroid cartilages was lessened by $7^{1}/_{2}$ mm. the vocal bands would be lengthened 5 mm. If the length of the vocal cords be considered 16 mm., they would be lengthened about $^{1}/_{3}$, which is entirely sufficient to explain the increase in tension which must be considered necessary to produce the above mentioned tone.

On the other plates one can see that the distance between the cartilages is gradually decreased the higher the desired note lies; if the scale is followed from note to note, there will be found small irregularities which are not to be considered remarkable since numerous causes lie at the bottom of these errors, which we cannot here discuss. As a whole, however, it is clearly seen that the distance mentioned is decreased about $^{1}/_{2}$ in a relatively high note, and in a deep note is decreased but in a much less degree. (Fig 2 and 3.)

We thereupon tried to determine which of the two cartilages was to be regarded as the punctum fixum. Since the larynx moves in toto during phonation, we stuck, for the purpose of measurement, three shot on the skin of the anterior border of the sterno-cleido-mostoid, which had been proven by the preceeding experiments to remain immovable during phonation. The shadows of the shot coincide on all the plates, so that they could very well be used for the purpose of measurements. It was shown that the cricoid cartilage moved upward toward the thyroid, while the latter remained in its original position.

As far as the thyro-arytenoideus internus is concerned the theories disagree still more, so much so that some state that by its contraction it causes relaxation of the vocal cord, while others, and indeed most, claim that its contraction makes the vocal cords tense. In what way this takes place has never been satisfactorily explained.

In order to get at the action of this muscle one of us (Möller) directed his attention to the elastic membrane of the vocal cords. If the ends of a rubber band are fixed in some way and the fixation points are separated from one another, the band becomes thinner in the middle, the more so the greater it is stretched. Something similar must take place in the case of the vocal cords, as can be shown with a small model. This consists of two triangular pieces of wood joined together by a cross-bar on which one plate can move to and fro. On two edges of both plates a rubber membrane is fastened so that it makes a sharp fold which corresponds to the free border of the vocal cords; furthermore, one border of the membrane is fastened to the cross-bar, corresponding to the attachment of the membrana elastica to the border of the cricoid cartilage. If the pieces of wood are now drawn apart it is seen that the folds become more and more concave. When the free border is $3^1/_2$ cm. long, it is 1 mm. from the straight line in the middle, with a length of 4 cm., it is 2 mm., and with a length of $4^1/_2$ cm., the deviation is $2^1/_2$ mm. If a thread is carefully fastened in the fold of the membrane and one end is fastened at the corner of one plate of wood, while the free end passes through a small groove at the corner of the other plate, the action of the thyro-arytenoideus can be imitated; for if the end be pulled it will be seen that the concavity of the fold disappears, and in the same way the thyro-arytenoideus internus causes by its contraction, the concavity of the full border of the vocal cords to disappear.

Therefore, the action of the crico-thyroideus is not sufficient to bring about the straight line, which the cords must possess in phonation. The stronger the muscle contracts the more concave becomes the border of the vocal cords; only after the thyro-arytenoideus has acted is the straight line produced. Both muscles must always work together to bring about that form and tension of the vocal cord necessary for the formation of a tone

The photographs show:

(1) Radiogram of a larynx during quiet respiration.
(2) Radiogram of a larynx during phonation of a.
(3) Radiogram of a larynx during phonation of d.
(4) Radiogram of a larynx during the formation of g.

In order that they might be reproduced clearly the pictures were treated in the following manner: The outlines of the laryngeal cartilages were drawn on the original Roentgen photographs with the "negrostift." and the pictures so touched up were again photographed.

A series of the original radiograms will be reproduced in the "Archiv. f. Laryngologie," Vo. XV.

VII

REPORT OF A CASE OF CHRONIC PURULENT OTITIS MEDIA, WITH THROMBOSIS OF THE LATERAL SINUS; RADICAL OPERATION; EXCISION OF INTERNAL JUGULAR VEIN; RECOVERY.*

EDWARD BRADFORD DENCH, M. D.

NEW YORK CITY.

A boy, about ten years of age, was admitted to my service at the New York Eye and Ear Infirmary, with the following history: Both ears had discharged since infancy. For about a week before the patient came to the hospital he had been suffering from pain in the ear so severe as to prevent his sleeping at night. Preceding his admission to the hospital this pain had increased in severity, and had extended to the mastoid region. On, examination, the boy appeared to be poorly nourished and extremely weak and anemic. The neck seemed stiff, the head being slightly flexed upon the right shoulder. Examination of the right ear showed that the greater portion of the membrana tympani had been destroyed. There was some granulation tissue in the fundus of the canal, and the postero-superior wall of the canal, close to the fundus, was greatly swollen, Palpation showed considerable tenderness over the tip of the mastoid, the tenderness extending backward over the region of the emissary vein. Examination of the left ear showed that the greater part of the drum membrane had been destroyed upon this side as well. There was no evidence of any acute inflammatory condition in this ear. The boy was then taken into the hospital, and at once placed upon the operating table. There was no fluid pus found in the antrum, although this cell contained some cholesteatomatous material. The entire cortex of the mastoid was rapidly removed and upon opening a large cell at the tip, considerable pus escaped. This pus pulsated, showing that it was in contact with the dura. On account of the history of long-continued suppuration, a radical operation was rapidly performed, the mastoid antrum, middle ear and meatus being quickly thrown into one large cavity. The cell at the tip containing pus, was next opened, the cortex being removed until the bottom of the wound could be wholly inspected. This removal of the cortex revealed the lateral sinus in the bottom of the bony cavity. The sinus was exposed by means of the rongeur as high up as the knee, and in the opposite direction as far as the bulb. On palpation, the sinus did not pulsate, and seemed to be occupied by a clot. In the exposure of the sinus, the mastoid emissary vein opening into it was also exposed. The clot in the sinus extended for a considerable distance out into the mastoid emissary. The sinus wall was incised, and by means of a curette, a clot about an inch long was removed from the upper portion of the sinus. Free hemorrhage took place from the torcular extremity of the vessel. Pressure was then applied and a curette was introduced into the sinus, and carried downward toward the bulb. Some portions of the clot were removed, but no free bleeding occurred. The boy had borne his anesthetic badly, and had required frequent hypodermatic stimulation throughout the operation. I therefore, decided to proceed no further, but quickly dressed the wound in the usual manner, and had the patient returned to his bed. Although the operation had lasted but fifty minutes, the boy was extremely weak, and I did not believe that he would bear the anesthetic sufficiently long to admit of an excision of the internal jugular vein at this time. After his return to the ward, where a high saline enema was given, the patient was also given strychnin in full doses hypodermatically. He rallied immediately and on the following day the temperature was 99½° in the morning. It rose to 101 in the afternoon, and as he was in such good condition I decided to excise the internal jugular. I was led to do this from the fact that I had obtained no hemorrhage from the lower end of the sinus and felt convinced that there was a clot in the jugular bulb. The operation presented no unusual difficulties. The vein was excised from a point about an inch above the clavicle to the base of the skull, the tributary branches being divided between two ligatures. The deep lymphatic glands lying about the sheath of the vessels were much infiltrated and were also removed. The wound in the neck was closed throughout its entire extent by interrupted sutures of silkworm gut and silk. The operation lasted about an hour and ten minutes. The boy was returned to bed in excellent condition and has made an uneventful recovery.

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*Read before the Eastern Section of the American Laryngological, Rhinological and Otological Society, at the meeting held in Fall River, Jan. 30, 1904.

An examination of the lymphatic glands removed and of the walls of the vein, showed that both structures were infiltrated with small cocci.

The case is of interest, in the first place, as showing how insidiously general systemic infection may occur in a case of chronic purulent otitis. The patient had been suffering from an aural discharge practically for his entire life, yet the acute symptoms were only of about a week's duration. Again, the boy had not been confined to bed and walked into my clinic, although he was at that time very seriously ill. Another point of interest is that at the time of his admission he had but a slight elevation of temperature. It must be remembered that invariably in all cases of chronic suppurative otitis, and especially in those in which acute symptoms supervene, before the mastoid is opened, the surgeon can form very little idea of the extent of the lesion. In this case the only evidence that was present of a severe infection was a profound anemia from which the patient was suffering and the appearance of the face which so often accompanies profound septic infection.

Another point of interest is the very radical steps taken to eradicate the source of systemic infection. I believe that if cases of sinus and jugular thrombosis are to be saved by operative interference, such interference must be of the most radical kind, and must be instituted before profound septic symptoms make their appearance. In this case, the boy on admission had practically no temperature, and aside from the fact that he looked very ill, and that his face seemed to indicate the presence of sepsis, there was absolutely no reason for supposing that so radical an operation as the one performed would be necessary. After I had thoroughly cleared out the mastoid, and removed the clot from the sinus, I confess that the temptation was rather strong to go no further. Had his condition permitted, however, I should have proceeded on general principles at once to excise the internal jugular vein. On the following day the condition appeared in every way favorable, and mistaken conservatism would have delayed the operation on the jugular. That this would have been unwise is clearly shown by the pathologist's report. Had we waited until there was a marked rise in the temperature before removing the internal jugular, it is more than probable that the operation would have been performed too late, and that the patient would have succumbed.

In a number of cases operated upon previously the patients have not come under observation until late in the course of the disease. In these cases the characteristic septic temperature has first been present, the fluctuations ranging from 99° to 106° in the course of a few hours. It has been my experience that whenever these pronounced fluctuations in temperature have been present, the convalesence of the patient has been much prolonged. I believe, in every instance where a clot is found in the lateral sinus at the time of operation, and free hemorrhage cannot be obtained from below, that the surgeon should proceed at once to excise the internal jugular vein and the surrounding lymphatics, if these are infiltrated. In my own patient, as before stated, the general condition of the subject did not permit of immediate operation, and, apparently, the twenty-four hours' delay did no serious harm. In all of these cases, however, where free hemorrhage is not obtained from below, excision of the jugular should at once be performed.

VIII

CHOLESTEATOMA, WITH REPORT OF A CASE.

DR. WILLIAM H. DUDLEY,

EASTON, PA.

OPHTHALMIC AND AURAL SURGEON TO THE EASTON HOSPITAL.

The term cholesteatoma is applied to tumors of neoplastic growth containing cholesterin and made up of laminated layers of squamous cells.

This mass when held between the fingers yields readily to pressure and gives a characteristic caseous feel; it also has a peculiar characteristic odor, which, I think, when once thoroughly appreciated is likely not to be forgotten.

These masses are usually roundish in shape, often of pearly whiteness on the outer surface, and of a yellowish or brownish color when broken open.

The first to describe this condition, as far as we are aware, was Cruveilhier in 1829, who observing their pearly glistening appearance, called them tumeur perlee; but it was not till 1838 that Johannes Müller made a careful examination of these masses and discovered that they contained cholesterin, as well as laminated squamous cells and called them cholesteatomata. Virchow in 1858 and still more recently Bostroem, in 1897, have gone still more extensively into the study of the condition; and from the standpoint of the latter there seems little left to be discovered, and were it not for the fact that the ultimate origin of these tumors is still somewhat nebulous, the length and strength of his argument need hardly be considered. He maintained that these tumors have their origin in aberant epithelial cells, which in

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some manner become included in the central nervous system (or elsewhere) at the time of their formation; in case the conditions favor proper nourishment these cells continue to develop and multiply, and in time may develop to more or less size by the process of cell multiplication on the exterior, while the interior often undergoes fatty degeneration and is associated with more or less deposit of cholesterin crystals.

On the other hand Benke has shown that the meningeal steatomata are produced by a proliferation of *endothelial* cells of the pia, and bases his opinion on the fact that staining brings out the outlines of these endothelial cells, which would not be true were the tumors of epithelial origin. He further states that, inasmuch as these tumors may be found in the meninges and ventricles of the brain, in the marrow of long bones and the petrous portion of the temporal bone, and in the testicle and ovary, the cells from which they originate and by which they grow must be of endothelium and not of the epithelial variety.

Among the cholesteatomata of sufficient size to be deemed worthy of reporting is one by Kuhn, reported in the *Zeit. f. Ohrenheilk*, Weisbaden, January, 1891, he states that there existed a mass of this character about the size of an egg in the mastoid process of a patient upon whom he operated and revealed the exposed dura mater of the cerebellum, thickened and pulsating, and lined with a thin white glistening membrane. Under treatment the parts healed within four weeks and the patient left the hospital.

F. B. Mallory of Boston reports in the *Reference Handbook of the Medical Science* that within the past few years there have been found three cases of cholesteatoma of the brain at the autopsy table of the Boston City Hospital. These ranged from one-half cm. to seven cm. in diameter; the first was found imbedded in the tissue of the cerebellum where it joined the pons; the second was found at the posterior end of the third ventricle, while the third and largest lay at the base of the brain on the right side, and extended from the optic commissure out beneath the right frontal lobe; it lay beneath the pia, and had so foreed itself into, displaced and compressed the adjoining brain tissue. It might almost have been thought to have originated within it.

Another large tumor of this variety is reported by Dr. O. Körner of Rostock in the *Archives of Otology*, Vol. XXX., p. 323. He states that it extended from the mastoid antrum backward to the torcular Herophili, that from pressure the cranial bones had lost their diploe and become very thin, and the lower part of the occipital lobes and the cerebellar hemispheres had become much compressed and displaced.

The mass appeared to have remained quiet till the patient had an attack of la grippe with acute otitis media, when it became infected through the aditus, when pain, fever and some swelling behind the ear called for operation. Although no measurements are given it is stated that the cavity would accommodate two hens' eggs. The patient recovered in about two and a half months.

In reference to the frequency with which these neoplasms are met, various writers vary widely in their opinions. Many state that the condition is rare, while among others, Grunert, for instance, states in the *Munch. Med. Wochenschr.* July, 1893, that he regards cholesteomata as retention masses, their involvement of surrounding parts resulting from their growth and pressure, rather than from direct infiltration, their occurrence being far from uncommon. During five years of clinical work he has found cholesteatomata in 17 per cent of all aural patients. I very much suspect that the authors who have spoken of this condition as being rare, have had reference to that form which is seen independent of suppurating otitis media; while those who consider it of common occurrence have reference entirely to the latter complication.

The case which I wish to present came under my care recently, and I deem it of sufficient importance to report it. Mr. ——— aged 40, married, belonging to a robust family of Pennsylvania Germans, a blacksmith by trade, came to the Easton Hospital, November 19, 1903, with the following history:

He states that he had always been healthy, had never had any trouble with his ears that he is aware of, and that up to a comparatively recent period his hearing had always been good, though he had noticed for a few months previous to his illness that his hearing was not as good as formerly; but he had had no pain, tinnitus or other disturbance until the be-

beginning of this present illness, which dated bacd about one week previous to being admitted to the hospital, when he had a dull, heavy feeling in the left side of his head, but not much pain until Nov. 11th, when he had some pain in the left ear; four days later he noticed a foul-smelling discharge from the ear. About this time upon examining the side of his head, two or three inches back of the ear, he could feel a depression in the skull, and as he pressed, a quantity of thick, cheesy, foul-smelling material was forced out of the auditory canal. The patient states that soon after this his headache became severe and at times his mind was not clear this occasioned considerable alarm and was the cause of his coming to the hospital.

Examination revealed that the auditory canal full of this caseous material, and on syringing it out, the return flow was followed by a foaming out of water, debris, etc., showing the presence of more or less gas in a cavity communicating with the auditory canal; the posterior wall of the canal was badly prolapsed, preventing a view of the deeper structures. He was admitted on the afternoon of Nov. 19th, 1903, and within an hour an operation was performed. On making an incision behind the ear and pressing the soft parts back, there spurted out a stream of fluid purulent material six or eight inches from the wound, again revealing the presence of gas under pressure. As the scalp and periosteum were removed backward from eight to ten cm. an opening was found in the cranium five cm. long, and varying from one to two cm. wide, into which a probe was admitted freely in all directions. This opening was enlarged sufficiently to clean out the cavity, the contents of which were for the most part a broken down, cheesy mass in the center, with the firmer cholesteatomatous mass, with more or less of the nearly white covering characteristic of these growths, in the periphery.

After thoroughly cleaning out the cavity, which now measured eight cm. antero-posteriorly, seven cm. vertically, and varying from two to four cm. in depth, the exposed cranial bones were found to be reduced by pressure in places to the thickness of thin card board, and thinning still more toward the opening where it disappeared.

The boundaries of this cavity were: Below, the posterior fossa, anteriorly, the petrous portion of the mastoid, medially dural covering of the cerebrum and cerebellum with the thinned cranial walls for the exterior.

The tissues adjacent to the cavity appeared healthy with the exception of a circular area of the dura immediately below the original opening, about the size of a twenty-five cent piece which looked greyish, though not especially diseased. After the operation the patient's temperature, which on admission was 101, soon became normal where it remained, and he was discharged from the hospital in about three weeks feeling well, but with a large portion of his cavity remaining, some of which he still carries.

After removing the neoplasm and cleansing the cavity, a communication was found to exist between the cavity and the auditory canal, fully one-half cm. in diameter, two cm. from the external auditory meatus, and it was through this opening that the patient was able to press out some of the decomposing tissue; although I looked repeatedly for the aditus, to establish communication with the tympanic cavity, it was not found, and although inspection showed a small perforation in the anterior segment of the membrana tympani, there was no discharge, and I am of the opinion that the perforation was caused by extra-and not by intra-tympanic pressure. Inasmuch as the hearing improved very much and promptly after the operation, I am led to believe that the tympanum was not infected through the aditus, nor the cholesteatomatous mass from the tympanum, nor to any degree was the tympanum infected by the way of the external auditory canal.

There is a possibility in this case, that in infancy this patient may have had an attack of otitis, which before the patient could remember recovered with an extension of epidermis into the mastoid, which in the course of years continued to grow by the constant forming and exfoliation of cells, which by their accumulation and pressure were responsible for this large cavity; but I would be more favorable to the supposition, that in the formative period of fetal life epithelial cells found their way into the posterior cerebral fossa and there, under favorable nutritive conditions, began to multiply and to crowd the brain in one direction, and by pressure caused the absorption of bone in the other, until this large cavity was formed, an opening established in the temporal and occipital bones, and another the external auditory canal.

The pressure of this material in the canal, and upon the membrana tympani caused its partial destruction, impairment of hearing, and the dull heavy feeling on the side of the head of which the patient complained, and this was all, till this mass became infected probably in the external auditory canal, when it extended backward into the mass of the tumor, when the rapid increase of pressure of the gas caused by its decomposition, brought on the more acute symptoms.

It is interesting to note the amount of displacement of the brain which these tumors may cause without noticable cerebral disturbance. In this case the displacement amounted to no more than thirty cc., though the one quoted by Korner the brain was displaced or compressed to the extent of eighty cc., or over two and a half fluid ounces; and the only explanation of this toleration, appears to be in the exceedingly slow growth of the tumor.

DISCUSSION.

Dr. E. B. Dench, New York—I have been very much interested in the paper by Dr. Dudley, as I am in all papers which bear on cholesteatoma. I must say that the case reported by him is a unique one, and that so far as I know, no case similar to this has been reported. I understood the Doctor to say that there was no tympanic infection; I think there must have been some tympanic infection, as otherwise it would have been impossible to have found a cholesteatomatous deposit in the mastoid. I believe that a cholesteatoma of the mastoid is invariably secondary to tympanic infection.

Dr. Dudley.—The reason I think the cavity became infected by way of the canal instead of the tympanum, was that there appeared to be an abundant opportunity for infection in this way, as the communication between the auditory canal and the cavity of the cholesteatoma was so large, and further I was never able to demonstrate a communication between the cavity of the cholesteatoma and the tympanum. The cavity has never made an attempt to fill by granulation, but the walls of which have become covered over with a membrane somewhat resembling mucous, and it has been a question with me for some time as to how best to dispose of it. If I could close the communication with the auditory canal I shall consider the question of closing the external opening also, but this appears to be a difficult thing to do. The interior is now perfectly clean and dry, and has been for some time.

Dr. Dench.—I would like to ask Dr. Dudley whether he did a radical operation or simply a typical mastoid operation.

Dr. Dudley.—The operation was typical of nothing. I simply enlarged the opening sufficiently to clean out the cavity.

Dr. Dench.—It seems to me that in this instance, I should advise that a typical radical operation be done, and that the middle ear and mastoid cells, together with the large cholesteatomatous cavity, be made continuous with the external auditory meatus. If this is done, and the interior of the cavity grafted by the Thiersch method, a perfectly smooth dry cavity would result I think it would be a mistake to treat the cholesteatomatous cavity separately, for as long as this space is separated from the middle ear and canal, the disease is liable to recur.

Dr. Dench spoke of two cases which he had recently seen in which the mastoid antrum seemed to be completely shut off from the middle ear by bony tissue; in each case there was considerable pus in the large cell at the tip of the mastoid. In all these case, mastoid tenderness developed early and at the time of operation the destruction of tissue in the mastoid was very extensive. The early appearance and the persistence of mastoid tenderness was in all probability, due to the fact that the superficial cells of the mastoid were extremely well developed and that infection of these superficial cells probably took place through the blood vessels leading from the middle ear to the mastoid; in neither of these cases did the patients complain of any spontaneous pain. It is in this class of cases that Politzer deems it wise not to enter the antrum at the time of operation. I do not agree with him on this point. I think that if no true aditus ad antrum can be found at the time of operation, one should be formed, as the layer of bone separating the antrum from the middle ear will always be found somewhat softened in these cases.

Dr. W. S. Bryant, New York.—I have never seen a case of this kind with such a large capsule, but I agree that it probably had a tympanic origin and started from diseases of the tympanic mucous membrane which is continuous with the lining of the mastoid cells.

IX

REFLEX CARDIAC INHIBITION RESULTING FROM IRRITATION OF THE PERIPHERAL FIBERS OF THE TRI-FACIAL NERVE AND OCCURRING IN THE COURSE OF AN OPERATION FOR CHRONIC EMPYEMA OF THE FRONTAL SINUS.*

GEORGE FETTEROLF, A. B., M. D.

PHILADELPHIA.

In the course of operations on the upper air passages, in regions supplied by the terminal fibers of the fifth cranial nerve, I have at times noted an embarrassment of the circulatory apparatus which was entirely out of proportion to the severity of the operation or the general condition of the patient. It was not until the patient whose case is herewith reported came to the table that the true inwardness of the situation occurred to me, and on looking up the literature of the subject and working out an explanation of the phenomena, I elicited several points which should prove to be of practical as well as scientific interest to those working in rhino-laryngologic fields.

The patient is a vigorous working man of 35 and a caulker by occupation. His family history is negative as far as his nasal condition is concerned, his father being alive and healthy at the age of 75, his mother having died from a gastric tumor at the age of 35 and his only brother having been killed at the age of 40. As a child he had measles and mumps and 13 years ago had a severe attack of inflammatory rheumatism, which left his heart unimpaired.

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* Read at the annual meeting of the Eastern Section of the American Laryngological, Rhinological and Otological Society. held at Fall River, Mass., January 30, 1904.

*From American Medicine.

His more recent personal history is of decided interest since during the last five years he has had three severe blows over the bridge of the nose and right frontal sinus, the first by a baseball 5 years ago and the others by pieces of timber 4 and 2 years ago. Following the first of these injuries he suffered considerable suprarorbital pain, associated with a great deal of hemorrhage and nasal obstruction. From this on he was never free for any length of time from a sense of fullness, throbbing and supraorbital pressure, associated with which was a feeling of exophthalmos. These attacks became longer and longer in duration and the intervals increasingly short. Winter before last he came to my clinic at the Methodist Hospital and I gave him only pallative treatment, as his condition then did not warrant external operation. The ideal procedure at that time would have been the conventional one of removing the anterior half of the middle turbinal, but his septum was so far deflected to the right that this was impossible and a straightening operation was out of the question, because the nasal irritation was too great to allow of even a brief retention of any form of splint. After attending the clinic for a few weeks, he disappeared and I saw nothing of him until the latter end of last February, when he returned with the old train of symptoms. At this time the middle turbinal was very much inflamed and there was a large polypus depending from its inner surface, near

the hiatus semilunaris. Removal of this failing to give him any relief I had him admitted to the house and put to bed. He was suffering intense pain over the right eye, his upper lid could scarcely be raised and there was distinct bulging of the supraorbital area. In addition the power of hearing in his right ear was becoming impaired. For a week his nose was spayed with a warm alkaline solution of suprarenal gland and cocain, followed by a bland oil. Cold compresses, changed every ten minutes, were used externally. He had a daily remission of his symptoms in the morning, but they would return in all their severity in the evening. Palliative treatment having availed nothing, I determined to operate.

The patient was prepared in the morning by shaving his moustache and eyebrows and his scalp as far back as the coronal suture. Just before the operation his conjunctival sac was cleaned with boracic acid solution and his forehead and face with mercuric chlorid solution and alcohol. The area of operation was covered with a sterile dressing which was allowed to remain in place until anesthesia was complete. The external incision began at the junction of the outer and middle thirds of the eyebrow and terminated over the lower margin of the glabella. The soft tissues and periosteum were retracted and a button of bone removed with a $^3/_4$ inch trephine. As soon as the edge of the trephine entered the sinus and before the button was completely severed sero-pus and flakes of lymph exuded from the wound. As the opening after the removal of the button was not sufficiently large to permit of thorough curetting of the sinus, it was enlarged upward and outward with rongeur forceps, care being taken to keep the supraorbital margin intact. The mucous membrane was found to be covered with foul-smelling granulation tissue and pus, which was especially thick at the entrance to the infundibulum. This was curetted away until the entire bony wall of the sinus was exposed. There were no spots of caries in the walls, nor was there any communication with the sinus of the opposite side. The probe passed freely into the nose without eliciting any suggestion of caries, and in the absence of Panas' probe an ordinary silver one was introduced into the infundibulum and brought out of the anterior naris. This was moved backward and forward a number of times and the passageway thus made patulous. The cavity was syringed freely with hydrogen dioxid until froth ceased to come from either sinus or nose and then douched with hot boracic acid and permanganate solutions. After thorough drying the whole interior of the sinus was swabbed with 50 per cent. zinc chlorid solution and again douched. The cavity was then packed with acetanilid gauze and the outer $^2/_3$ of the wound closed with interrupted silk sutures, the inner third being allowed to remain open for the purpose of packing and douching. An ordinary sterile dressing was applied, the eye being covered with a disc of gauze dipped in boracic acid solution and the hollow at the inner canthus filled with cotton.

The interesting feature of the operation was the occurrence of a trigemino-cardio-inhibitory reflex. Each time the curette would be applied to the sinus wall there would be a marked diminution in the force, fullness and frequency of the pulse, along with distinct cyanosis. The curetting had therefore to be frequently interrupted. This phenomenon has occasionally been noted in operations involving areas supplied by the fifth nerve and especially by dentists. One of my assistants told me that he frequently anesthetized for dentists and when chloroform was the anesthetic used had so often noted cardiac embarrassment at the instant of the extraction of the tooth that he had become quite timid about giving an anesthetic for any dental operation. The particular area of the fifth nerve involved in the case just described was, of course, the mucosa of the sinus. In none of the standard textbooks on anatomy have I been able to find any description of the nerve-supply of this region. It must unquestionably be from the trifacial, and examination of a number of skulls leads me to the belief that the principal source is from the supraobital with possibly additional filaments from the nasal and the malar branch of the temporomalar.

That this reflex does occur has been proved experimentally by Brodie and Russell [1], who, among their conclusions, state the following: "The connection of the respiratory tract with the cardio-inhibitory center is very close. Thus, stimulation of the nasal mucous membrane at once arrests the heart. Stimulation of the laryngeal mucous membrane is only a little less effective. Stimulation of the trachea and large bronchi is apparently without effect, but stimulation of the alveolar nerves is about as effective as that of the laryngeal. These nerves produce the result when stimulated electrically in their course from the mucous membrane or when stimulated electrically or mechanically in the mucous membrane itself." The path of the impulse is clear. It runs through the afferent fibers of the fifth to the Gasserian ganglion, then through the fibers of the sensory root to the deep origin which comprises the sensory neuclei in the floor of the fourth ventricle and the gray substance of the substantia gelatinosa of Rolando as far down as the second cervical nerve. From these situations the path to the nucleus ambiguus, which contains the motor centers of the vagues, is short and direct and is probably through some of the fibers of the posterior longitudinal bundle.

Normally, the relations of the nuclei of the fifth and tenth cranial nerves are directed and controlled by centers situated higher up. This control is usually not materially interfered with during ether anesthesia, but when chloroform is used the connecting fibers between the two deep origins are given much freer play, and as a consequence any irritation of the peripheral fibers of the trigeminus may produce, through the cardio-inhibitory fibers of the vagus, an amount of disturbance which may vary from only a slight degree of embarrassment to actual cessation of the heart's action. In this way may be explained some of those deplorable accidents which have happened during adenoid and dental operations and a safe rule to follow would be never to use chloroform when the area about to be operated on is supplied by sensory fibers of the fifth nerve.

A similar reflex has been proved to occur in operations on the ear by the experiments of Reik [2], who performed a number of operations on the tympanic structures of dogs and measured and determined accurately the effect produced thereby on the circulatory apparatus. He concludes: "The results of these and similar experiments tend to show that the faintness and other effects which attend operations upon the tympanum are due mainly to disturbance of the vasomotor apparatus, through irritation of the sensory nerve supply; that these nerves when stimulated show a depressor effect and usually a cardio-inhibitory action, though under some circumstance the pulse rate may be increased; and that complete anesthesia prevents the transmision of such an influence by these nerves and partial anesthesia weakens this influence."

The occurrence in aural manipulations is of much greater frequency than when the upper respiratory tract is the field of operation. It has frequently been noted and mentioned in the former connection and has occured at the hands of all of us. I have seen it on the mere introduction of the speculum, during the incision of a furuncle, during the removal of cerumen and during operations involving the tympanic membrane. The anatomic relations here are of great interest and afford a ready explanation of greater frequency with which these symptoms occur in aural compared with rhino laryngologic work. The nerve supply of the external auditory meatus is derived from the auriculotemporal branch of the trifacial and from the auricular branch of the vagus, while the tympanic membrane depends for its nerve supply on the tympanic plexus, which is made up of the tympanic branch of the glossopharyngeal and the caroticotympanic (least deep petrosal) branch of the carotid plexus of the sympathetic. In the case of afferent impulses originating in the external meatus the path is evidently one of two:—either through the mandibular nerve and Gasserian ganglion, as described above, or through the auricular branch of the vagus to the ganglia of the root and trunk, and thence to the small-celled or sensory nucleus common to the ninth, tenth and the accessory portion of the eleventh. From here to the nucleus ambiguus is but a short and easy step. In the case of the tympanic membrane the path is probably through the tympanic branch of the ninth to the jugular and petrosal ganglia, thence to the sensory nucleus just mentioned, and then to the nucleus ambiguus or motor nucleus common to the ninth and tenth nerves. It is thus evident that the anatomic connection between the external auditory apparatus and the cardioinhibitory apparatus is much closer than that between the upper respiratory tract and the cardioinhibitory center, and in this would seem to lie the explanation of the fact that cardiovascular embarrassment occurs and has been noted so frequently in operations on the former, while in the latter it has passed practically unnoticed.

The after history of the case described is uneventful, with the exception that in spite of the most rigid surgical cleanliness the wound in the soft tissues became infected. As a consequence there was some annoying edema of the right eyelid, which was, of course, partly due to the necessary division during the operation of the supraorbital artery and vein. This extended to the eyelid of the opposite side, probably on account of pressure on the left angular vein, and for several days both eyes were practically closed. Some ptosis of the right side remained for several weeks, but disappeared as the inflammatory exudate became absorped. There was, of course, and still is the usual numbness of the forehead incident to the division of the supraobital nerve.

The external wound was not allowed to close for six weeks, and when the gauze drain was finally removed the wound healed quickly. The accompanying photograph shows what a slight degree of disfigurement remains. A slight pit which will receive the very tip of the little finger, and a suggestion of broadening of the nasal end of the eyebrow are all that remain, the rest of the scar being concealed by the eyebrow.

Systematic treatment of the nasal chambers was continued throughout, and for a while an apparently atrophic condition seemed to be developing in the area over which the pus from the infundibulum flowed, but when the pus ceased to form, the mucosa speedily returned to its normal condition.

This open method of treating the wound, while necessitating unsightly bandaging or strapping for a considerable time, does certainly seem to be the more rational procedure. What we are after is an ultimate good result, and we should not allow an ultra-refinement of cosmetic treatment as regards the bandaging interfere with our efforts to secure the best final good for our patient. Our final success must depend upon the thoroughness with which cleansing can be carried out, and while there can be no question that it is possible to syringe or douche the sinus from the nose, it is likewise certain that far more thorough irrigation can be carried on through the external wound. And if the operator is careful to see that the sinus which is allowed to form for therapeutic purposes is confined to the inner portion of the eyebrow, the only deformity which will ensue will be a shallow pit over the dehiscence in the anterior wall and a slight broadening of the eyebrow at the point which was allowed to remain open.

328 South 15th Street.

BIBLIOGRAPHY.

(1) Brodie and Russell. Journal of Physiology. Vol. XXVI. 1900-1901. p. 92.

(2) Reik. Trans. Amer. Otol. Soc. Vol. VIII. Part 1. p. 114.

X

LOBULATED NASAL POLYPUS COMPLETELY OBSTRUCTING BOTH CHANNELS, WEIGHING 255 GRAINS.

LINN EMERSON, M. D.

ORANGE, N. J.

This patient, a coachman, aet. 35, gave a history of nasal polypi for 13 years, with complete nasal obstruction for the past 8 years. While in Ireland he was an inmate of a hospital in Dublin for 9 weeks, during which time a number of operations were performed with forceps and snare. After coming to this country he had numerous operations performed in Kansas City and later in Chicago, and while large numbers of polypi were removed, at no time was the complete nasal obstruction relieved in the slightest measure.

His appearance when he presented himself to me was that usually seen in these cases. He had the so-called frog face, with slight separation of the nasal bones. No eye or sinus involvement. General health excellent; height, 5.8; weight, 175 lbs.

There was a marked deviation of the septum to the right, and both nasal cavities were completely filled with polypi, which the patient informed me occasionally protruded from the nares and bled when irritated. The left naris being much more roomy was first attacked.

At a sitting occupying an hour and a half, I removed with a snare about a dozen polypi, the largest of which was about the size of an English walnut. The whole number completely filled a one ounce medicine glass. The following week I attacked the right side, but it being less roomy I secured only about half the quantity of polypi.

Presented to the Section on Laryngology and Rhinology of the N. Y. Acad. of Med., Dec. 23, 1903.

One week later the patient's personal appearance was much improved and both nasal cavities comparatively clear, but both posterior nares were still completely occluded by polypi which occupied the vault of the pharynx.

I completely removed the left middle turbinate and made a number of ineffectual attempts to get a snare around the polypus. Even with my finger in the pharynx I could not get the loop around the growth, as every attempt to push it upward and outward met with a resistance I could not understand.

At the patient's urgent request I finally desisted and asked him to return again in a week.

On his return he insisted his nose was still too sore to permit me to do anything further, but I finally succeeded in persuading him to allow me to remove his right middle turbinate, promising him I would make no effort to remove the growth.

I passed a pair of Knight's turbinate scissors deeply into the right side and with two cuts separated the turbinate throughout its entire attachment.

To the surprise of the patient and myself the specimen here shown dropped into the pharynx and was ejected from the mouth.

It weighed 255 grains.

It was lobulated, and the deep sulcus between the two lobules had embraced the posterior edge of the septum, thus explaining the complete stoppage of both nostrils and my inability to get the loop of the snare around the smaller lobule while working through the left nostril. Only two or three small polypi have since been removed, and when I last saw him he was to all appearances entirely cured. Since by the removal of his turbinate he has so much breathing space even in his narrower side, he has refused to allow me to correct his septal deviation.

XI

THE APPLICATION OF CONSERVATIVE AND RADICAL SURGERY TO CHRONIC NASAL ACCESSORY SINUS DISEASE.*

DR. R. B. CANFIELD.

NEW YORK.

The subject matter of this paper has been secured by observations upon some two hundred cases of chronic disease of the different nasal accessory sinuses, treated radically, and upon one hundred and ten cases treated conservatively. Upon a minority of these cases I have had the opportunity to operate myself. I have assisted at all of the rest and have carried out the after-treatment of the great majority.

Before passing to the consideration of local treatment, I wish to add my testimony to that of those who have insisted upon the treatment of the general condition. Too many argue, that, if proper local measures are taken the general condition will speedily improve. While this is true in a great many cases, it fails in a great many. It is also true that the local condition improves much more rapidly when the general health is cared for. A hospitalized patient does not heal well, and other things being equal, that method of treatment should be chosen which discharges the patient from the house the soonest.

It is conceded that some cases of chronic empyema yield to conservative measures, while others require radical ones. It is upon the per cent. of those which should belong to each class, that operators differ. Jansen makes the statement that if one sinus is affected, all the sinuses on that side of the head are more or less affected, and believing that, feels compelled to adopt radical methods more often than most other men do. In my experience fully one-half of all chronic empyemas of the antrum are simple, not combined. At least in a series of forty-six cases, twenty-one were uncombined. That is, disease in the other sinuses had shown itself neither by symptom nor sign. Recognizing that empyema may lie latent without the exhibition of pus, the ethmoid and sphenoid were exploratorily opened with negative result. By far the greater number of cases can be treated successfully conservatively, and recourse to radical operation should be had infrequently. Careful and accurate diagnosis and painstaking treatment will be successful in the great majority of cases. I speak of complete relief in 50 per cent. of all chronic cases and in 90 per cent. of uncombined ones.

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*Read before the Eastern Section of the American Laryngological Rhinological and Otological Society, Fall River, Mass., Jan. 30, 1904.

To consider first the application of conservative treatment to chronic empyema of the antrum. There are three methods; the alveolar, that of the canine fossa, and the intranasal.

The operation through the alveolus is, in my opinion, admissible only when a diseased tooth may be considered the active etiologic factor, and only in such cases can it be expected to yield good results. It is applicable to uncombined cases only and should never be considered the operation of choice. Although, according to Hajek and Killian, the antral mucous membrane has no particular predisposition to infection, still the trauma caused by forcing a drill through the alveolus may be sufficient to cause irritation enough materially to prolong the duration of the disease, even to infect a previously healthy antrum, from the germ-laden mouth secretions.

Communication with the mouth is in all cases to be deprecated and the first step in conservative treatment should be to close such an opening. The strongest argument that can be urged in favor of this method is that it affords free egress of fluid pus already in the antrum. The fact that it does not afford drainage from the most dependent part of the antral floor, is sufficient to show that it does not perfectly fulfill even this duty. Then too, pus in the antrum is not always fluid. It many times is very tenacious and stringy, and may lie fastened so firmly to the walls or roof, that it is removed with difficulty, even with the forceps. The after treatment generally employed is judicious irrigation or the dry method, followed, in order to maintain the lumen of the opening of sufficient size, by the insertion of a wick of gauze, than which there is no better medium for the conduction of infective material, unfortunately, however, in both directions. If the antrum is practically dry, that is, if there is no formation of pus in the antrum itself, the upper end of the wick is nevertheless soaked with infected secretion very soon after its insertion. Then too, as Luc has put it, the patient is forced for a long period to take his food flavored in a sauce of iodoform and pus.

What has been said of the alveolar method, may be said also of the method of operating through a small opening in the canine fossa. In addition it may be said that here, as no caries or diseased tissue exists, as drainage is not very good, and additional infection almost certain to take place, there is no indication for this method of operative procedure. Soon the operator is confronted by the fact that he must either insert a hard rubber obturator to maintain a permanent opening or allow the wound to close. In the one case he forces the patient to wear a foreign body in his mouth for the rest of his life, while if he adopt the other measure he may reasonably expect a recurrence. To reopen the wound is to court reinfection. It is in the pursuance of these two methods that careful control is impossible, and recurrences most frequently occur. Many times the operator after seeing his case do well for several weeks or months, is dismayed to find not only a recurrence of symptoms, but an aggravation of the previous condition.

It is, I think, from intranasal methods that the best results from conservative surgery must be expected. To their successful use belongs not only the treatment of the sinuses affected, but of the entire nose and naso-pharynx. (This and the following statements do not refer to cases whose sole cause is an infected tooth.) Pathologic conditions are always found, and it is very generally seen that permanent results are not secured until they are corrected. It is evident that a deformed middle or inferior turbinate or ethmoidal bulla may interfere with the proper drainage of a frontal ethmoid or antrum. The fact that hypertrophic conditions are seen in almost all cases, is significant. When an obstructing septal deviation exists, the empyema is found on that side toward which the septum deviates. If the posterior end of an inferior turbinate, or a mass of adenoid is seen to be markedly greater upon one side than upon the other, it is on that side that the empyema is generally to be found. That this is not mere coincidence is, of course, granted. The question is, in-how-far is the hypertrophy an important etiologic factor in the causation of empyema and how far does it influence its course. The hypertrophic condition, either congenital or arising from external conditions, occupation, mode of life, and so forth, particularly predisposes to influenza, diphtheria, scarlet fever, mease's, and repeated head colds which are themselves the diseases most important in the causation of empyema. It is continual sneezing, hacking and coughing that loosens the mucous membrane from the naso-pharyngeal wall and predisposes to polypoid degeneration, polyps and severe infection. Nasal hypertrophy not only predisposes, but is also a direct etiologic factor, and may be considered to act in one of two ways. A posterior end or a mass of adenoid may become a depot for the deposit or formation of pus, and so become a continual feeder of infective material which may find its way into any of the accessory sinuses and set up an empyema essentially chronic from the start. The condition, then, which has been so important in causation, is naturally an important agent in determining the chronicity of the disease. I can recall cases that had for months resisted treatment, some of which had gone on to radical operation with counter opening in the nose, and which continued to pour out pus for months, finally clearing up after the removal of some apparently insignificant mass of hypertrophy.

Hypertrophies act then, as sources of infection and reinfection. They act also in another way equally important. That is, they prevent free nasal respiration, and free nasal respiration is the *sine qua non* in the successful intranasal treatment of chronic empyema. It is the failure to note this fact that compels many operators to resort unnecessarily to radical methods. It is important not only that sufficient air for breathing purposes, pass through the nose, and that the patient keep his mouth closed, but that the nostrils functionate properly. According to the theory first advanced by M. Halle, of Berlin, the action of the air passing in and out through the nose is that of a chimney, drawing out the air and incidentally any secretion from the accessory sinuses through their ostia. In my opinion, this is important. In no other way can I account for the presence in the middle meatus of strings of dry tenacious pus which have made their way slowly out of the anterior accessory sinuses. It may be said that in the sinuses this pus was fluid, but dried after appearing in the nose. This may, to some extent, be true, but some of these cases, when opened radically, show just such tough strings of pus, very firmly adherent to the sinus walls. They often extend from the inner wall out through the ostium and into the nose. Then too, the patient after a Killian radical frontal operation, can by forced inspiration, aspirate the entire ser us contents of the frontal sinus backward into his throat. Nor is this aspiration confined alone to the course of the inspired air usually given in the text-books. It is marked in the inferior meatus as well, as evidenced by the fact that the flow of tears can be much hastened by snuffling, and by the fact that a few grains of iodoform powder blown into the antrum, soon make their appearance in the inferior meatus, if an opening be present there. To those who believe in this theory will be evident the importance of correcting any abnormalities that may interfere with free and proper nasal respiration. Drainage of the antrum by aspiration into the nose is in my opinion freer and as a therapeutic agent more satisfactory than drainage by any other method. This has been born out by clinical results, for, since this theory has been evolved, cases which had previously done poorly, have after removal of nasal deviations, spurs, and so forth, made satisfactory recovery. The first step then, in this line of surgery is to establish free nasal respiration, and to correct any pathologic condition that may exist. In attacking the antrum it is in my mind, immaterial, whether one choose the middle or the inferior meatus. Personally, I prefer the inferior. Here the bone is thicker, it is true, but these is less danger of penetrating the orbit. The inferior edge of the inferior turbinate should be removed in order to give free approach to the lateral wall of the nose. An opening should then be broken into the antrum one-half an inch by three-quarters in size. This is easily done with an electric drill or with a mallet and chisel. A curved metal tube, 3/8 of an inch in diameter is inserted into this opening, and the the sinus vigorously Politzerized. Very generally by this first inflation, pus is found, though in many cases, even when pus is in the antrum, it does not make its appearance at this time. The antrum should then be thoroughly irrigated, and again Politzerized and again irrigated and dried thoroughly. Iodoform powder may then be insufflated. By this method it is safe to say that any pus in the antrum will be secured. It is important to note that at the time of operation, or at any time during the after treatment, although the antrum may sound dry at the first Politzerization, it is not wise to consider it so, for small masses of pus which are the sources of infection and which must be removed are often adherent to the walls. To overlook this fact renders the operator likely to consider the antrum healthy. This is especially true where the antrum is opened for diagnostic purposes, transillumination being negative and no positive signs of antral disease being present. A second irrigation and Politzerization are necessary to dislodge such masses. I believe in discontinuing irrigation at the earliest moment, and resorting to the dry treatment. Regeneration of the mucous membrane must thus be better assisted. This method of treatment of uncombined empyemas of the antrum appeals to me. The use of the electric drill is almost painless, quick and easy. It makes a large enough opening, so that the after treatment can be carried out without discomfort and in great part by the patient himself. In favor of this method of treatment is the fact that this opening may be maintained without danger of reinfection, and that careful control is thus made possible. It should prove satisfactory in certainly not less than nine out of ten cases.

The cases which do not clear up are combined, and, in my experience, with the ethmoid. Indeed, there is no doubt but that the ethmoid serves as a source of infection in the great majority of obstinate combined empyemas, and in all obstinate cases, should be most carefully examined. If the ethmoid is involved, removal of the anterior half of the middle turbinate exposes several of its cells. If care be taken, operating at each sitting only so far as the field is clearly visible, ethmoids of small size may be very well cleaned out through the nose. An invaluable aid is the speculum of Kill an for median rhinoscopy by which the different openings of the ethmoidal cells can be very clearly seen and the points of pus detected. Free daily use of the soft probe often detects infected cells not before suspected. Thoroughness in operating on the ethmoid is most important in determining the degree of success to be obtained. The anterior two ethmoidal cells and those extending over the orbit, cannot be reached through the nose. In cases which do not yield to this much surgery, the frontal sinus is probed, catheterized or Politzerized as may be possible

In extensive ethmoidal disease involving the posterior cells, the sphenoid is at once suspected, and must be examined. The first step toward inspection of the sphenoid is the thorough removal of any septal deviation obstructing the view of the sphenoidal orifice. The opening can then in a large per cent. of cases be made out. For narrow noses, where the ostium is invisible, these is suggested under cocaine and adrenalin, the use of a soft slender silver probe, bent somewhat like a Eustachian catheter, but with a more uniform gradual curve. This probe is inserted, convexity upward, between the septum and middle turbinate, and pushed gradually upward until it rests against the cribriform plate. It is then pushed gently backward until the posterior pharyngeal wall is felt. It is now in the immediate neighborhood of the sphenoidal opening. A little manipulation very generally succeeds in passing it into the sinus. Hypertrophic turbinates do not obstruct, as the probe is passed above them, and septal deviations, whether cartilaginous or bony do not extend so high. The perpendicular plate of the ethmoid immediately below the lamina cribrosa rests almost always in the median line so that approach to the sphenoidal orifice by this route is free. If neither polyps or granulations can be felt, the patient may sit for ten to thirty minutes, the probe in position, and head bent forward, in the hope that any pus present may make its appearance on the probe. If this procedure is negative, a slender canula following exactly the curve of the probe that has already been successful' is inserted. The sinus is catheterized and a very fair idea of its condition is secured. If it be found diseased, the entire anterior inferior wall is removed, and the sinus wiped out with cotton-carrying forceps. Great care must be taken to remove the entire wall to prevent the formation of exuberant granulations and scar tissue. By removing this wall completely the annular contraction around the orifice frequently so troublesome is largely obviated, that is until the sinus is healed. After which it may be allowed to take place. This, of course, presupposes the correction of any septal deviation toward the affected side, and is facilitated greatly by the Killian speculum, which can be inserted almost to the posterior pharyngeal wall. The obstinate sphenoidal empyema is almost always combined with disease of the posterior ethmoid cells, so that they must always be considered together.

So far can one go along intranasal lines, and not until so much has been done, carefully and painstakingly, is one warranted in considering radical surgery. The first end to be secured is the alleviation of distressing symptoms, such as pain, headache, neuralgia, sense of head pressure and of illness. These are always greally improved by the first evacuation of pus which can be accomplished quite as well and with much less cost to the patient by conservative as by radical methods. It is only when there is present malignant growth, caries, cerebral symptoms, or imminent danger of fistula formation that one may proceed at once to the greater operation. One should never resort to radical surgery because the symptoms are severe, the pus foul. and the physical depression profound. It is not by any means, true that the most chronic cases are always the most difficult to treat, and are those to require radical measures. One should not consider that because the patient has had a foul-smelling empyema for twenty years, that it will not yield to conservative methods. Many authors have expressed surprise that antra that have discharged a most fetid pus for years, should clear up completely after being irrigated a couple of times The reason for an apparently remarkable cure is not far to seek. They belong to what Avellis calls "Eiter-rest-Empyeme" (empyema due to traces of pus), and owe their condition to the fact that after the acute inflammation has subsided, the pus loses its virulence, lies stagnant in the cavity, forming slowly and being discharged slowly. The mucous membrane assumes a certain tolerance of its presence, and absorbs it with reluctance. The chief evidence of this condition is a desquamation and caseation of the antral epithelium, similar in odor and appearance to the cholesteatoma of chronic suppurative middle ear disease As long as the natural antral orifice remains patent, the material makes its escape easily, especially at night. It is only when the orifice becomes occluded by dried pus or by some other means, that the antrum becomes filled with a semisolid, remarkably foul, cheesy tumor that may and sometimes does perforate the antral wall, generally the anterior one.

When now it becomes necessary to resort to radical operation there seems to me to be but one method to pursue. I have classed the intranasal operation, described by Dr. Curtis before this society last year, as a conservative one. When one chooses to operate radically, he feels the necessity of securing a free and comprehensive view of his operative field. This can be secured only by operating through the canine fossa. I have said that in general only combined empyemas require radical measures. Therefore, in operating upon the antrum, that operation should be chosen which exposes for examination and treatment not only the antrum, but also those sinuses in combination with which it is most frequently diseased, namely, the ethmoid and sphenoid. For this purpose the Kuster operation is insufficient, and the so-called Luc-Caldwell operation, or some modification of it, should be chosen. The one that appeals to me the most strongly is the one employed by Jansen, though I differ from him in some points that seem important.

The operation is as follows:

First careful cleansing of the teeth.

Second, shallow anesthesia.

Third, insertion of gauze strips between the cheek and the superior and inferior rows of teeth, to prevent hemorrhage backward into the throat.

OPERATION. First, incision through the mucous membrane and periosteum, just above the tooth line from the first molar to the first incisor.

Second, retraction of the periosteum and resection of the entire frontal wall of the antrum.

Third, careful inspection of the antrum, its walls, mucous membrane and contents.

Fourth, more or less thorough erasion of mucous membrane.

Fifth, removal of the median wall by means of forceps.

Sixth, curettage of the ethmoid through the area corresponding to the insertion of the middle turbinate.

Seventh, inspection of the previously treated sphenoid and removal of any pathologic contents, with resection of the entire anterior-inferior wall.

Eighth, formation of the mucous membrane flap and counter opening into the nose.

Ninth, loose packing in the antrum, ends extending into nose.

Tenth, suture of the mucous membrane flap to the median end of the initial incision.

Eleventh, complete suture of the initial incision for primary union.

In commenting upon this operation. I wish to say that a thorough and comprehensive view of the antrum, ethmoid and sphenoid is secured. The importance of leaving as much mucous membrane as possible, is great. Knowledge of the pathologic conditions existing in chronic antral disease, and the success of conservative methods of trea ment, leads one to infer that much of the mucous membrane always removed during radical operation, would, if allowed to remain, regenerate. If there is doubt in the mind of the operator concerning the viability of mucous membrane, it should not be removed. It can do no harm, and even the smallest bits shorten the duration of the after treatment. By this method of treatment, one or two anterior ethmoid cells are always found that could not be reached through the nose. In large ethmoids there still remains another anterior cell and some extending over the orbit that cannot be reached even by this method.

The mucous membrane flap may be made in two ways: An incision antero-posteriorly along the inferior edge of the attachment of the inferior turbinate is made; another along the floor of the antrum; these two are joined posteriorly. The flap thus formed is about one-half by one and a quarter inches. It is turned into the antrum and its tip sewed to the buccal mucous membrane in the line of the initial incision and near its median end. The second method is that used by Killian. It is made as follows:—The first incision is the same as the first incision of the other method—along the attachment of the inferior turbinate. From the anterior and the porterior ends of this incision, two short ones are made vertically downward to the floor of the antrum. The flap thus formed is turned down over the antral floor and held in position by one suture. The second flap is somewhat larger than the first, and is especially adapted to cases in which the anterior wound is to remain open, as the removal of the gauze packing through the nose is likely to loosen it. The packing in the antrum should be loose, arranged carefully, and when the initial incision is closed should be led by two strands well into the inferior meatus. Else it is removed with difficulty, and may even require a primary anesthesia. It should remain five days. Care must be taken to smoothe the edges of the bone opening to prevent the formation of exuberant granulations and possibly gangrene of the flap. The sphenoid should not be packed. If it is carefully wiped out at the time of operation, the hemorrhage from this point will generally be slight, and if it does occur, is safer to let it bleed than to fill the sinus with gauze.

The relation of the sinus to the optic nerve and brain is so intimate, its walls paper-thin, even containing dehiscences, that pressure upon the bleeding points of the small branches of the spheno-palatine arteries that nourish the lateral walls may cause the backing-up of blood, elevated pressure, permanent injury to the optic nerve, or even hemorrhage into the cranial cavity, as I have seen occur.

The after treatment consists of a judicious use of irrigation, Politzerization and the dry method. Its duration is variable, and extends over a period of months, depending largely upon the care with which it is carried out. After the first ten days, the patient properly instructed and furnished with a suitable tube, can carry it out at home. Here, again, it is important to rrigate as infrequently as possible to assist the formation of new mucous membrane and scar tissue, and to prevent the formation of exuberant granulations. If these granulations form at the ostium of the sphenoid, they can be removed with a sharp spoon. In the most troublesome cases, they form in the antrum and may require even a re-opening of the primary incision. Despite this fact, in all cases where it is deemed possible, the anterior wound should be closed, else the antrum becomes merely a very slowly healing depot for the reception of infective material and food. There are cases of caries, perforation and malignant growth, where the wound must remain open. In these the healing is facilitated by the early application of large Thiersch grafts, the larger the better. Packing should be discontinued early, or as soon as the grafts have taken, the granulations kept down by silver, and the buccal wound closed with a plug of cotton. Even after the wound has entirely healed, a roll of cotton which can be changed at will, will generally be found to be more agreeable to the patient, and to cause less irritation to the mucous membrane than a hard rubber obturator.

Not only does an unclosed antrum serve as a receptacle for infective material, but it so often causes most unpleasant subjective symptoms, such as sensations of pain, cold, lightheadedness and occasional vertigo which may persist.

The fact that cases of combined empyema of the antrum, ethmoid and sphenoid which resist careful, conservative treatment, are generally those with large atypical ethmoids which are difficult, dangerous and sometimes, even by this method, impossible thoroughly to eradicate, renders doubtful the prognosis for absolute recovery after even the most radical antral operation. These cells must be approached by another route—by an external operation generally through the frontal sinus.

Many different methods for operating upon the frontal sinus have been advocated, but most of them have fallen into disuse. In the case of this sinus one should resort to radical methods with the greatest reluctance, and it is unfortunately here that the least can be done conservatively. In proceeding radically, one presupposes that every effort along conservative lines has been made, that neither the antrum nor the sphenoid is the cause of the continuance of the frontal disease, but that it must lie either in the frontal sinus itself or in the orbito-frontal or anterior ethmoid cells. The anterior ethmoid cells open either into the infundibulum or into the frontal sinus, and clinical experience bears out the statement that these are always infected together. The former is generally the source of the sinus disease. The operation chosen for the relief of this condition must be done to expose thoroughly both these areas. I shall consider three methods of procedure.

First. That of Hajek, whose object is to secure drainage of the sinus.

Second. That method by which the frontal sinus is to be obliterated by the formation of granulations and by packing.

Third. Killian's operation for the obliteration of the sinus without packing.

To consider the first briefly.

An incision is made through the soft tissues and periosteum passing through the eyebrow from its temporal to its median end. From the median end a second incision passes vertically upward to the superior margin of the sinus previously determined by the Roentgen ray. An osteo-plastic flap corresponding to the anterior wall of the sinus is then cut and turned back into the soft tissues. The entire mucous membrane is erased, bony septa removed and the walls of the sinus smoothed off. The naso-frontal duct is enlarged as far as possible, the remaining ethmoid cells are excavated and the sinus cleansed. A conical drainage tube is inserted into the opening between the sinus and the nose, and the wound saturated for primary union. The tube is to remain in place for at least three months, and is to be removed through the nose. It is as large as can be conveniently inserted, and sufficiently conical to hold it in position. From time to time during the after treatment it is gently drawn up and down to prevent its becoming adherent The object in this operation is, of course, to prevent deformity and to preserve the sinus as well as to eradicate disease. In the first two he is generally successful. Deformity is practically absent; however, out of seven cases, he reports two recurrences at eight and nine months after the operation respectively, and while still under daily observation. These recurrences occurred unexpectedly and without symptoms. The other five cases are still recent, and are under treatment. Against this method of operating there is urged in the first place that the necessity of wearing the drainage tube for three months is decidedly unpleasant. Hajek claims that epidermatization takes place readily around it, and that any granulations may easily be controlled with nitrate of silver. Considerable contraction must surely take place, however, after its removal. Again, it would seem that the condition in the frontal sinus that existed before operation might again obtain. One of the chief causes of the chronicity of the disease is the deposit of small pockets of pus in the various irregular recesses of the sinus, their inspissation and subsequent formation of fibrous tissue septa. The resulting chamber-building prevents perfect drainage and tends toward recurrences. It is quite possible that with a wide communication with the nose, this reinfection and secondary chamber formation might again occur.

The second method, that in which granulation formation from the bottom is desired and packing to be the after treatment, may be carried out as follows:

First. An incision through the eyebrow from its tempora to its median end, curving downward over the frontal process of the superior maxilla and cheek.

Second. Frontal sinus entered through the anterior wall near the median line.

Third. Formation of a narrow linear incision through the bone from this opening along the supraorbital ridge to the external boundary of the sinut. This is easily done with a Doyen rongeur.

Fourth. Enlargement of the two extremities of this incision so as to receive the jaws of the two rongeurs, by mean of which the frontal wall is broken off in the soft tissues to form the osteo-plastic flap. The soft tissues and osteo-plastic flap are then held out of the way by a retractor, which must be managed with considerable care to prevent injury and possible loss of the bone flap.

Fifth. Removal of the floor of the sinus and inner wall of the orbit.

Sixth. Complete erasion of the frontal mucous membrane and eradication of bony septa.

Seventh. Curettage of the ethmoid.

Eighth. Inspection of the sphenoid.

Ninth. Careful cleansing of the sinus and insertion of iodoform packing.

Tenth. Replacing of osteo-plastic flap and suture of the primary incision. The center stitch and gauze to be removed on the fifth to the eighth day. Packing is then carried out through the central third of the incision, the external and internal thirds remaining undisturbed.

By this operation, anterior ethmoidal and orbito-frontal cells that had escaped observation at the time of the radical antral operation are exposed. A free view of the infected sinuses is secured. Indeed, a more radical operation could scarcely be performed.

As to its after results.

First. Upon the eye. In a large per cent. of cases no evil effect is noted. On the other hand, in many cases more or less unpleasant conditions result. One symptom complained of is diplopia, which follows the complete or partial loosening of the pulley of the superior oblique muscle from its bony attachment. If temporary, this diplopia lasts from seven to fourteen days; it may be permanent. Another symptom is dimness of vision which may result from excessive lachrymation. This lachrymation is due either to ptosis and consequent faulty situation of the superior lachrymal puctum or to permanent induration at the internal angle, which presses upon the lachrymal duct. Another and more serious dimness of vision results from injury to the eye itself. This may be the result of an acute iritis set up at the time of operation by pressure upon the eyeball by the retractor. This iritis may run the usual course and disappear without sequellae or develop into a chronic condition, evidenced by no pain, slight injection and considerable impairment of vision. Again, dimness of vision may be due to a condition which I have noticed in two cases of amblyopia following this operation. It is evidenced by a very slight injection of the nerve head and accompanying loss of its clear outline. Its fibers melt off into the retina indistinctly, especially upon the nasal side. Trouble, therefore, seemed a traumatic neuroretinitis. Vision in one case was $^1/_{30}$, in the other $^1/_{15}$. The refractive media were clear. The only abnormalities present were the ones described. In both cases the amblyopia had persisted two years.

Second. Cosmetic results.

Small frontal sinuses yield the best cosmetic results, for the osteo-plastic flap is smaller and any displacent consequently less noted. Packing also need be continued for a shorter time. Unfortunately, accidents sometimes happen to the bone flap at the time of operation or later. It may be lost wholly or in part. During the formation of granulation tissue and subsequent retraction, the upper edge may become adherent to the posterior wall of the frontal sinus and cause the lower edge to tilt forward. Both these accidents are difficult to prevent and naturally have a bad effect upon the cosmetic result. They may even require secondary or tertiary operations which do not yield brilliant results. Another unpleasant result, which sometimes occurs, is a permanent induration in the neighborhood of the inner canthus. This can be obviated slightly by gentle massage after the scar is firm. Again, continued packing of a wound so difficult to bandage properly, and where it is desirable to expose the eye at the earliest possible moment, renders infection very probable. I have seen cases most carefnlly treated, granulate nicely from the bottom and only after a couple of months found filled with pus. Such infection always makes an ugly scar.

Keeping the lips of the wound separated allows the lower lip to drop down and more of less pronounced ptosis of the upper lid to result. The longer the [packing, the greater the the chance for reinfection, for ptosis, for induration, the greater the depression and the wider the scar. The shorter the duration of the packing, the less firm the granulation, the greater the danger of recurrence.

There is to be urged in favor of this operation that it is radical and permits, as far as possible, the eradication of the diseased condition. Against it is urged that it requires months of observation, packing and treatment; that the cosmetic result is doubtful; that injury to the eye is possible.

There remains to consider the operation of Killian. Inasmuch as there exists nowhere in the literature a perfect description of its technique as it is now performed by him, I will describe it in detail.

First. Mark the line of incision with a sharp scalpel; incision begins at the temporal end of the eyebrow and is carried through it to the root of the nose, dividing the nasal section of the musculus quadratus in the centre of the frontal process of the superior maxilla. It ends in an oblique curve outward below the base of the nasal bone.

Second. Periosteal incisions.

1. This incision is made five to six millimeters above and parallel to the supraorbital margin. From the temporal end of the skin incision to the suture between the upper ends of the nasal bones.
2. The lower periosteal incision follows the course of the skin incision, beginning just median to the attachment of the pulley of the superior oblique muscle.

Third. Puncture the frontal sinus just above that piece of bone included between the periosteal incisions. Retract periosteum, chisel through the anterior wall of the frontal sinus, exposing but not perforating its mucous membrane.

Fourth. Determine the size of the frontal sinus by means of a probe moving between the bone and the mucous membrane.

Fifth. Excise the front wall of the frontal sinus completely.

Sixth. Erase mucous membrane.

Seventh. Remove the floor of the sinus without injury to the supraorbital margin. While doing this, the operator stands behind the head of the patient.

Eighth. Remove the frontal process of the superior maxilla, and the remaining part of the sinus floor. Remove the frontal process without injury to the nasal mucous membrane.

Ninth. Excavate the ethmoidal cells and sphenoid, if necessary.

Tenth. Make the mucous membrane flap from the uninjured nasal mucous membrane. At the edge of the nasal bone, perforate the nasal membrane by a pointed scalpel. By means of a probe-pointed scalpel, continue the incision upward and backward $^1/_2$ c.m. below the cribriform plate, then downward. This flap of the mucous membrane is turned outward and used to cover those parts of the wound facing the nasal cavity, This establishes a permanent communication between the frontal sinus and the nose.

Eleventh. Cleanse the wound with salt solution, dust with iodoform; suture the incision for primary union.

Twelfth. After treatment. Place the patient on the healthy side; forbid him to blow his nose. He must aspirate the secreted fluid of the wound. Daily dressings. By no means flush the nasal cavity.

Procedure for radical operation of both sinuses is the same as for the operation upon one side. Begin by removing the front walls of both sinuses and remove the interfrontal septum.

To Illustrate Killian's Operation.

Comments. The skin incision in this method is made with the greatest care and precision. It is very long, and to prevent deformity and to secure perfect coaptation, attention must be paid that corresponding parts are brought into opposition. To accomplish this, it has been suggested to make little nicks at right angles to it, after its course has been marked out by the scalpel. It is not necessary to shave the eyebrow. Its presence is a valuable landmark, and it can readily be disinfected. Stitch abscesses do not occur in the orbital part of the incision, but when present are found in the dependant portion. Care is taken not to weaken the bridge of bone between the periosteal incisions by undue pressure at the time of operation, as its displacement or loss is followed by marked depression and deformity. The periosteal incisions are made with exactness. The length of the lower one has recently been changed, as it was found that loosening of the pulley of the superior oblique muscle sometimes occurred when the line of incision extended clear to the temporal end of the skin incision as it formerly did. Beginning as it does now, median to the attachment of the pulley, it has no such effect. Attempt is made in all cases to prevent the puncture of the mucous membrane of the frontal sinus as long as possible. The size of the sinus can be made out by means of the probe passed along under the bone, but outside the membrane. Unnecessary infection of the sinus cavities and wound edges is thus avoided. The anterior wall of the sinus is thoroughly removed. Any overhanging edges are taken away, and left perfectly smooth, as in persons with transparent skins and deep sinuses the edge is for some time plainly seen. Attention is paid to the most thorough erasion of the mucous membrane of the sinus, including the under surface of the bone flap. By standing behind the patient while removing the sinus floor the pulley of the superior oblique is avoided. Even though the bone flap is left in position the ethmoid and sphenoid are as readily accessible by this as by any other method. The formation of the flap from the mucous membrane of the middle turbinate and the lateral wall of the nose is important, as it assists materially in preventing formation of exuberant granulation and shortens the after treatment. Atropine is instilled into the eye at the close of the operation as a prophylactic against iritis. In this operation also especial attention must be paid to the eye. Pressure against the eyeball is to be avoided as far as possible. I think the narrower the retractor the less the danger to the eye. The cosmetic results, as far as I have been able to see, have been very satisfactory, Below the bone flap there is absolutely no depression. If no stitch abscesses occur the scar is very slight. The bridge of bone prevents loss of contour of the orbit. Removal of the entire sinus floor allows the orbital fat to push upward so as to fill the depths of the sinus. The question arose in my mind whether this change in the orbital pressure might not cause some anomaly in the tension of the extraocular muscles, but careful test of one case showed no heterophoria.

There is for several days after the operation more or less flat depression above the supraorbital bridge. However, by the formation of new granulations and the pushing upward of the orbital fat this is but slight and grows steadily less. f it remains noticeable it can be relieved by a subcutaneous injection of paraffin.

The statement that Killian makes that he cures his patients without deforming them seems justifiable. The after treatment is very simple. For several days the serous contents of the wound is expressed into the nose and aspirated backward by the patient. During this period of convalescence he is not allowed to blow his nose, lest he fill the wound cavity with the nucopurulent secretion of the nose, or possibly cause an emphysema.

Finally the posterior surface of the soft tissues becomes adherent to the posterior frontal sinus wall. When this has taken place the patient may be considered to be more definitely healed than if his sinus were filled with a mass of granulations. After a few weeks a probe can be passed through the nose into a small cavity about the size of a hazel nut. The frontal sinus itself is completely obliterated.

CONCLUSIONS.

I have permitted myself to draw the following conclusions:

Conservative methods are successful nine out of ten uncombined cases.

Conservative methods should always be given a thorough trial before recourse is had to radical ones.

Uncombined empyemas are not uncommon.

Difficulty in healing is not always in direct portion to the duration of the disease.

Drainage of the antrum is secured most satisfactorily through the nose.

The ethmoid is the chief cause of the chronicity of obstinate combined cases.

The sphenoid is readily accessible through the nose in a large per cent of cases. It can be probed in 90 per cent. of cases by the method advised.

The establishment of free nasal respiration is an important factor in securing permanent results.

The radical operation should be resorted to infrequently.

The best radical antrum operation is the modified Luc-Caldwell.

The best frontal operation is that of Killian.

Frontal sinus operations not closed at the time of operation cause deformity.

Great care must be taken of the eye at the time of the frontal operation.

Accidents to to the eye are:

First. Loosening the pulley of the superior oblique, causing diplopia.

Second. Dimness of vision due to:

First. Extraocular causes—lachrymation, conjunctivitis.

Second. Intraocular causes — iritis, neuroretinitis.

DISCUSSION.

Dr. C. C. Coakley, New York:—Discussing the cases of sinus disease presented by the Chairman, Dr. Richards, he has to be congratulated upon the excellent results obtained and the comparatively inconspicuous scar. The first case, that of an elderly gentleman who was cured by intranasal operation alone, is an example of what results when the drainage from a sinus is made perfect. But few chronic cases, however, can be cured by a procedure so simple, although it is always worth trying. We believe that the chances of cure depend upon two factors, both of which are unknown. One, the extent of the diseased mucous membrane, and the other the anatomic configuration of the sinus. If the mucous membrane is only moderately hypertrophied, then efficient drainage frequently results in a cure. On the other hand, if the mucous membrane is intensely edematous and polypoid in character, and the cavity so placed or divided by septa that drainage cannot be made perfect, then an external operation only can effect a cure.

The removal of the entire middle turbinate is not necessary for establishing drainage through the naso-frontal duct. It is usually only necessary to remove the anterior third of the middle turbinate. However, one must not forget that the naso-frontal duct occasionally opens much further back in the middle meatus than commonly found. In a case operated upon about ten days ago, I found the opening of the naso-frontal duct 1 1/4 inches posterior to the vertical plate of the frontal bone. In this case, the anterior half, at least, of the middle turbinate must have been removed to free the lower opening of the naso-frontal duct. Of the cases shown, which have been operated upon by the removal of the orbital plate of the frontal bone, some have been cured, and one still has a fistula leading into the frontal sinus. The scars in these cases are very well situated to minimize the deformity. It seems hardly possible, however, that one can reach all the recesses of the frontal sinus through such a method of operating. This must be so if the sinus is large. I have, therefore, seldom had recourse to opening a frontal sinus through the orbital plate, prefering to operate through the vertical plate of the frontal bone. The radical operation demands the removal of the entire mucous membrane of the frontal sinus, so that the cavity may fill up with connective tissue and be obliterated. Any shred of mucous membrane that remains in the cavity is bound to keep up its secretion. For this there must be an outlet—either through a fistula in the line of the incision, or, else, through the naso-frontal duct into the nose. In either of these cases—although the patient may be gretly benefitted—we cannot consider that we have made a cure.

I want to express my hearty appreciation of the very admirable paper read by Dr. Canfield. I know of no short paper in which so much good material can be found as in that we have just heard. It would be very difficult for me to discuss all of the valuable points he has touched upon, in the time at my disposal. I think the Doctor has explained very well—what some of the rest of us have believed—in regard to the drainage from the accessory sinuses. Undoubtedly, the currents of air, passing in and out of the nose, do exhaust and suck out some of the secretion from the accessory sinuses, and thus materially aid in effecting a cure in both acute and chronic cases. There is, however, another factor of which he did not speak, namely, the act of blowing the nose. This compresses the air in the accessory cavities thus forcing out the secretion. Anyone who has irrigated the nose until the nasal chambers are free from pus and asked the patient to blow the nose, will have noticed the secretion that is forced out by the compressed air in cases of diseases of the accessory sinuses. Dr. Canfield intimated as much when he gave an account of Jansen's instruction to the patient about not blowing the nose after being operated upon, but hawking it down through the naso-pharynx.

If I understand the Doctor rightly, catheterization and irrigation of the sphenoidal sinus were seldom possible. Up to two years ago, I thought the same way. I was always seeking—by inspection—to find the opening of the sinus. Those which were wide open I could get into quite easily. I found that, by taking a probe and feeling around in the neighborhood of the normal orifice on the anterior wall of the sphenoid, it was very easy to locate and enter the orifice The only thing which markedly interferes are atresias between the middle turbinate and the septum. It is not nearly so easy to operate on the sphenoidal sinus as it is to catheterize it. It is far easier to enter the sphenoid sinuses through its normal than it is to enter the orifices of any of the other accessory sinuses. There is one thing of which Dr. Canfield speaks, and which I highly commend, and which many have overlooked in their zealousness to operate and that is, the freeing of the nasal cavities of hypertrophied mucous membrane and polypi, and, also, determining just how many of the sinuses are involved. One is often surprised to find how much can be done for patients if polypi are removed and the ethmoidal cells curetted intranasally. While it may be impossible to open each and every ethmoidal cell, the majority can be reached in this manner. Do this before you operate on the antrum or the frontal sinus and if the patient does not get well, then perform the radical operations. The operation on the frontal sinus which I have been doing, is one which results in the obliteration of the cavity and it has been successful, thus far, in every case. The incision is made through the eyebrow, 1/4 of an inch above the supraorbital arch, periosteum pealed upward and so much of the anterior wall of the frontal sinus is removed by chisel and forceps, as to reach each and every part of the frontal sinus. It is not necessary to remove all of the anterior wall to do this, but yet sufficient must be removed to make certain that no incomplete septa hide any diseased mucous membrane. The mucous membrane is then removed in its entirety until we have a bare, bony cavity; the last portion curetted should be the naso-frontal duct in order to prevent the blood passing into the nose and naso-pharynx. The cavity is then lightly packed with iodoform gauze, the outer half of the wound sutured, and a piece of the gauze allowed to protrude through the inner angle of the wound. No drainage tube or gauze is inserted through the naso-frontal duct into the nose. The gauze is removed at the end of a week, and, without irrigating, the cavity is again repacked. This performance is repeated every three to five days until, each time inserting a smaller amount of gauze, the frontal cavity is filled up and obliterated with connective tissue. Healing is accomplished in from four to six weeks —occasionally a little longer.

The Killian operation on the frontal sinus is familiar to us through his own writings and those of others. Dr. Canfield's description of his latest modification make a most valuable contribution to this subject. The fault I have to find with Killian's operation, as he originally described it, is the placing of a drainage tube from the frontal sinus to the nose. This leaves a channel for future infection, which is fatal to any capacity lined with connective tissue. So far as the deformity is concerned, it is seldom possible to predict its amount. When asked about it, I reply that the deformity will depend upon the size and formation of the frontal sinus, and that I know of no way of predicting, before the operation, these factors. Transillumination may give us some idea of the size of the sinus, but it cannot be relied upon too implicitly.

Dr. F. C. Cobb:—I have listened to this paper with great interest and have to thank the writer for so comprehensive a review of the subject. The questions involved in frontal sinus operation make it worthy of our most thorough study. In Boston the operation which has found favor has been the one which Dr. Richards has shown us here today. Where failures have occurred it has been from the gradual cicatrization and contraction of the nasofrontal duct. Luc, the originator of the operation, has himself abandoned it in favor of the Killian which the reader has so well described. The Killian operation is not however without its disadvantages, in which must be reckoned the danger of interferance with the eyesight. After the anterior wall of the sinus has been removed and the ethmoid is opened, then the upper wall of the orbit must be removed. To do this without injuring the pulley of the superior oblique muscle of the eye is not always an easy task. The most painstaking removal of every bit of diseased tissue and bone is necessary and any lapse means a second operation. Recurrence with any known operation will occur and only time and experience can show us the one least liable to this disadvantage. Where the frontal sinus alone is involved the operation of Dr. Coakley offers great advantages. The long duration of the after treatment is a disadvantage but the resulting scar is not marked and the prospects of recurrence are small, if any. What we need most it seems to me is a frank statement of the disadvantages as well as the advantages of each operation by operators having experience with that operation.

Dr. Clark:—I have had no experience with the very radical operations on the sinuses, Killian's and Jansen's, which have been spoken of today. I would like, however, to take this opportunity to emphasize what Dr. Coakley has said in regard to thoroughly cleaning out the nose before making up one's mind to resort to a radical operation. This is a very important point. Let us be conservative and careful not to be carried away by the desire of doing a brilliant operation from a consideration of what may be best for the particular patient before us. It goes without saying that the less operating we can do and attain a successful result the better for the patient. I have in mind a case which is now under my care. The patient, a woman 35 yeats old, has had profuse purulent discharge from the left nostril as long as she can remember. I began by clearing out the ethmoid region, at the same time frequently washing out the antrum, which contained pus. As soon as I got rid of the middle turbinate and the ethmoid cells, I found that the sphenoid sinus also contained pus. The patient is now very much relieved, using only one or two handkerchiefs a day, when she had formerly used seven or eight. The only source of pus now is the frontal sinus and the amount is very small. I am able to probe the sinus from the nose, follow it up with a small curette and then wash the sinus through a small canula with an antiseptic solution. The patient is anxious to avoid a radical operation and I am willing to persevere as I have been doing as long as there seems to be improvement. I will mention one other case which I operated on last summer, employing the operation that Dr. Richards has so successfully used on the cases he has shown here today. This patient had very severe headaches which have been entirely relieved. There is no longer any pus from the frontal sinus. At the time of the operation I opened the antrum through the canine fossa and found that apparently the mucous membrane was not diseased at all. Thinking, therefore, that the antrum was probably only the repository for the pus from the frontal I did not make a permanent large opening into the nose. This was a mistake as the antrum still secretes pus and I shall have to operate on it again. The frontal sinus is to all appearances well.

Dr. Coakley:—I desire to show some curettes which have been made in different sizes and shapes for removing the mucous membrane of the accessory sinuses. Most of the curettes on the market with which I am familiar, are made with more or less mallable shanks, and, when very much pressure is made on the handle for the removal of the mucous membrane, the shaft beds. I have had my curettes made with rigid right shafts, but of varying angles and shapes, in order to reach the various parts of the antrum and the frontal sinus. I have used them a number of times and find them to be an improvement over the Myles curettes or any of the straight variety.

XII.

THE IMMEDIATE RELIEF OF HYSTERICAL MANIFESTATIONS OF THE LARYNX.*

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ST. LOUIS

Hysterical manifestations in the larynx are common enough to fall frequently into the hands of every laryngologist. The treatment likewise is successful enough to warrant an almost positive promise of relief in at least the majority of cases. There is, however, much to be learned, both as to the development of newer and more satisfactory methods and as to the reasons for the successes in individual cases.

It is in view of these circumstances that I present my method which, though original with me so far as I know, may yet have been used by others. I do not assert for a moment that the method results in anything but a relief from the laryngeal symptoms or that monosymptomatic hysteria exists, and that, therefore, the symptomatic relief is tantamount to a cure. Nor is it certain that the relief is of any longer duration than that from other plans. But it is clear that the method is simple, absolutely painless, easy of application and withal successful.

All plans of treatment have as their basis the deception of the patient, or, perhaps I should say, direction of the patient's mind away from false conceptions toward possibilities that are within his reach if only he will utilize them. In other words, suggestion in one form or another is used. This may be extended over a period of time, or it may be so decided that it is effective at the first sitting. To the former class belong such plans of treatment as manipulations of various kinds and operations distant from the seat of the symptoms. Often, too, operative interference in the neighborhood of the larynx or applications to the larynx or pharynx will be followed by relief after a longer or shorter time. Consecutive treatment of any kind may have a similar effect in ridding the patient eventually of his symptoms. Immediate suggestion, on the other hand, is mainly used through the medium of a strong electric current which is sent through the larynx, and generally becomes effective at once.

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*From the Journal of the American Medical Association, Jan. 16th, 1904.

The method which I desire to detail is of this type, but it requires no instrument except the index finger and a ready tongue on the part of the operator.

At the first sitting, having recognized the case as one of hysteria, I state to anyone who happens to accompany the patient that the case is quite clear and easily relievable, but, turning to the patient, I say: "You must agree to let me do what is necessary. I can not consent to undertake the treatment unless you are willing to submit yourself to the treatment." The patients invariably say that they are willing to stand anything provided there is any likelihood of a cure. Of course, I give an absolute promise as to relief and send the patient home to think and to worry about it, or, if it is desirable, proceed at once to work. In any event, I generally deliver a short and more or less sentimental talk to aphonics on the word "home," which I state is the first word that they will utter, the most beautiful and easiest to pronounce in the English language. Having secured the requisite confidence and interest, I place the patient on a chair and I insert the index finger of the right hand into the pharynx and press the epiglottis over the glottis until the patient becomes somewhat uncomfortable, when I withdraw my finger and say in a loud commanding voice, "Now, say 'home, home, home!'" The patient responds and the command is continued as often as necessary until the patient repeats not only "home," but any word suggested, and leaves the office talking as well as anyone. At the next sitting I look into the larynx and state that everything is in perfect shape and the treatment concluded.

Of course, the character of conversation must be modified as the requirements of the individual demand, but in the main the procedure above indicated may be adopted.

In my earlier cases I stated that there was a dislocation or defect in the larynx which my treatment would relieve, but I now make no statement of what I affect to discover in the larynx in consequence of the advice given to me by Dr. Schwab. He called my attention to the fact that hysterics are prone to adopt suggestions to their own detriment, although the suggestion be made for their relief. In two of the three relapses the error of this plan was shown. In the first case one of my patients (which one, I do not know) called on my assistant during my absence in Europe and said that she had another dislocation in her throat and that I had cured her before by sticking my finger down her throat and invited him to do the same. He did so, and she became phonic again.

In the other case, that of hysterical mutism, the recurrence, I am sure, was made possible by my error in detailing the supposed cause.

The cases to which the method has been applied cover the whole range of the commoner hysterical manifestations of the larynx, such as aphonia, mutism and cry. The result was in every instance successful except in one not reported were for the reason that I did not have a fair opportunity to do the necessary work. The case was one which I saw for a few moments only in the office of Dr. Freudenthal of New York during a visit to that city. The case was a very obstinate one, having been the rounds of largngologists without benefit. The Doctor had been unable to relieve her, and asked me to try my plan. Of course, I could not and did not secure the patient's confidence and, therefore, nothing resulted

The cases which I report will fairly demonstrate the variety of conditions that may be relieved and likewise the method of applying the suggestion. Of course, in every instance, I explained the nature of the condition and the character and true facts of the treatment to some sensible member of the family. To do otherwise would have placed me in the ranks of the charlatans. The responsible member of the family is entitled to know that there is no real operation, and that the method used is purely one of suggestion. It is best, generally, to postpone giving this information until just before resorting to the suggestion. Of course, it is necessary to enjoin the informed not to let the patient know the true facts and not to discuss the condition with the patient or friends.

General treatment is indicated in all these cases, especially such as may influence the hysteria, which is the basis of the condition that causes the patient to consult a laryngologist.

SUMMARY OF CASES.

CASE 1.—*Hysterical Aphonia, Paralysis of Adduction.*—My first case was that of a girl, aged 17, who came to my clinic suffering from the classical symptoms of hysterical aphonia. After showing her to my students and demonstrating the hysterical paralysis of adduction, I endeavored to pursue the usual plan of sending a current of electricity through the larynx. My battery was out of order, so being at a loss for an agent with which to influence the patient, it occurred to me that I might accomplish the same result by suggesting that something was dislocated in the larynx which I could easily replace and thereby accomplish a cure. Somewhat to my surprise the patient recovered her voice as soon as I withdrew my finger and announced that everything was in proper order again.

CASE 2.—*Hysterical Aphonia, Adductor Paralysis.*—In January, 1900, I was asked by Dr. Jacob Geiger of St. Joseph to see a young girl, E. B., aged 13, who had been suffering from aphonia for six months. This had come on suddenly and had not yielded to treatment, which had been, in the main, nerve and blood tonics and sprays. There was no previous history except an attack of acute rheumatism some years before. The girl was of a very lively, nervous disposition, very capricious and somewhat anemic. Having learned of the case beforehand, and readily recognizing the condition, I had sent word to the mother that her daughter would speak within two minutes after I saw her. As a consequence of this the patient was prepared for something extraordinary. I made a hurried examination and confirmed the diagnosis and stated to the patient that if she were willing to submit herself to the treatment, however severe it might be, I would have her saying "home" in less than a minute. She consented. I adopted the usual plan, and withdrawing my finger suddenly, commanded her to say "home, home, home." She did so, and acting on my direction she called up her grandfather by long-distance telephone and within three minutes after I saw her she was talking to him in proper voice for the first time in six months. There has been no recurrence, as I learned from Dr. Geiger, under whose charge the patient now is.

CASE 3.—*Hysterical Aphonia, Adductor Paralysis, Anesthesia of the Pharynx, Hysterical Cough.*—The father of A. B. had written to me in May, 1900, from Louis ana describing his daughter's condition. He stated that she had lost her voice suddenly eight weeks before, and since that time could whisper, but not phonate. He asked me to telegraph if I could relieve her. Knowing well what the effect would be on the young lady, I telegraphed to him that I could cure his daughter. As I surmised, when she arrived she was perfectly satisfied that I would cure her, and I had little difficulty in making her have full confidence in what I promised. As usual, I advised her that the operation which I should perform would necessarily be a severe one. She stated she was willing to stand anything. Unfortunately, a well-disposed patient, who became acquainted with the one whose case I am reporting, assured her in a sympathetic way that the operation would not be painful and that she need not have any fear. To this I lay the necessity of making three efforts before I was successful. I found the patient, when she came into my operating room, very much calmer and not disposed to fear the operation. After I withdrew my finger the first time her voice was slightly more phonic. Looking into her throat I stated that the cords were not in proper position. I made another effort, this time with more success, for now she spoke in a rather hoarse but fairly phonic way. After examining the larynx I stated that it was almost in the exact position which I wished it. The third effort was successful. Since that time there has been no return whatever. Curiously, after the disappearance of the aphonia she developed a hysterical cough, which, however, lasted only a few weeks. Dr. Bauduy, who examined the case, confirmed the diagnosis of hysteria. The mother was intensely hysterical, and immediately after the young lady's voice returned I isolated her from her mother for three days, fearing the effect of her sympathy and the maternal hysteria. In this case during the attack the cords could not be approximated, during the efforts at phonation the space between the arytenoids being fully 7 millimeters. Anesthesia of the pharynx was marked.

CASE 4.—*Hysterical Aphonia.*—F. M., aged 22, first lost her voice suddenly in September, 1900. One week later it returned suddenly. Two weeks after this the voice again disappeared suddenly and reappeared within one week. The last attack came on a month before she consulted me, which was on Dec. 18, 1900. This attack differed somewhat from the other in that she could not even whisper at first, but a week before she began to whisper again. There was no pain, no discomfort and no globus hystericus. Her general health was good, but she was somewhat anemic. Previous health had been good. I made an examination, stated that there was a condition in her larynx that required immediate attention, lectured to her on the easiest word in the English language, namely, "home," assured her that this would be the first word she would speak, and having thoroughly frightened her secured her consent to go through the necessary performance on the following day. She returned very much worried, very much interested, and determined to undergo anything to recover her voice. The usual plan was adopted and her voice returned immediately, and there has been no recurrence of the aphonia since.

CASE 5.—*Hysterical Mutism, Adductor Paralysis, Hemianesthesia, Anesthesia of the Pharynx.*—I was consulted in November, 1900, by Mrs. M. G., a widow, aged 41, who presented the following history: In February, 1899, an operation was performed on the right axilla. After this she remained in bed for four months. July 1 she found it impossible to phonate, her voice becoming suddenly of a whispering type. Aug. 2, 1899, her voice was lost altogether, it being impossible for her even to whisper. Since that time she had been unable to phonate or to whisper. She stated that she had never been able to speak in a loud tone since the operation, and evidently ascribes her trouble to the operation. There was no definable cause for either the whispering or the attack of mutism. She states she had a choking sensation, after which her voice disappeared. Her mother died of consumption when the patient was 5 years old. Her father died in the army from a wound. There was no nasal discharge and there were no symptoms of throat trouble, except that she complained that her throat felt sore on the right side (the side on which the operation was performed). She had frequent attacks of headache of the migraine type, both sides being affected. The attacts came on without any special regularity. There was no cough, no expectoration, no clearing of the throat. Her appetite was fair; her bowels regular; no difficulty of respiration; occasional choking sensation at night; general condition fair. Both Dr. Chaddock and Dr. Schwab, who examined this patient at different periods, found unmistakable evidence of hysteria and numerous stigmata, such as hemianesthesia, anesthesia of the pharynx, etc. The patient, who had been suffering from mutism for 16 months, was brought before my class, giving me an occasion to make a distinct impression on her as to the seriousness of her condition, the possible severity of the operation and the beautiful influence of the word "home," the first word which she learned she was to speak in 16 months. Of all the patients whom I have treated in this way she was most affected. She responded at once to treatment and her voice returned. On Sept. 25, 1902, she again consulted me on account of the loss of voice of two days' duration. I found a very acute inflammation of the pharynx, tonsils, lingual tonsil and larynx. The usual remedies were applied, and though the acute inflammation disappeared the aphonia continued. It was evident that she remembered her previous attack, and was probably influenced by a fear that there had been a second dislocation in the larynx. Not desiring to complicate the matter, as it was evident that suggestion in this case had as much power for evil as for good, I concluded to use another method in this case. Consequently I made an application to the linguial tonsil of a strong solution of nitrate of silver, having stated to her without undue explanation that she would be enabled to talk immediately thereafter. Success followed this application.

CASE 6.—*Hysterical Aphonia, Hoarseness.*—Miss M., aged 24, consulted me in December, 1900, on account of her hoarseness, which had lasted for six months. Two years before I had endeavored to relieve her of hysterical aphonia by galvanization with but indifferent success. She could phonate at times, but her voice was always hoarse, while she had occasional relapse into complete aphonia. Her general health was fair, though she was nervous and disposed to be melancholia. One sister suffered from melancholia for two years but finally recovered. Examination showed that the vocal chords did not approximate when phonation was attempted. The usual plan was followed, and although such a case could not offer the same promise as one of complete aphonia, the patient entirely recovered and has continued free from trouble except occasional attacks of hoarseness, which, however, last but a short time.

CASE 7.—*Hysterical Cry.*—I. S., aged 13, consulted me in April, 1901, at the instance of Dr. B. L. Dorsey, with the following history: She had been more or less sick all winter with what was designated nervous prostration. Other than this there had been no trouble except painful spots along the right leg. About three months previous to this time the peculiar shrill cry first appeared and within the limits of its characteristics it had continued since that time. The cry did not appear until 4 o'clock in the afternoon (after school) and it continued at intervals of from one and a half to two minutes, until she went to sleep. From that time until the succeeding day at 4 o'clock she was free from its presence. The cry, which lasted about two seconds, resembled the sound of a prolonged *ai*, and the intensity was about that of the voice of a child when calling another at some distance away. The quality, duration, pitch and intensity, so far as I could observe or learn, were about the same under all conditions, whether the child was on the street or in the house. The girl was very much mortified about her condition, and strove to conceal it, manifesting great disinclination to leave home. Examination of the nose, pharynx and larynx showed nothing abnormal. Dr. Chaddock found stigmata of hysteria, which naturally confirmed the diagnosis. Although this case hardly afforded the scope for suggestion after the method detailed that the aphonic cases offered, it was finally decided to adopt the same plan. Accordingly, after the usual preliminaries and after being assured by the patient that she was willing to stand anything which would afford relief, I inserted my finger into the larnyx until she became very uncomfortable, and withdrawing it suddenly I said, "Now you are all right!" I then examined her larynx and stated to the doctor and mother that everything was now perfectly normal. Since that time she has never had a single attack. I saw her last in March, 1903.

CASE 8.—*Hysterical Aphonia, Anesthesia of Palate and Pharynx.*—Miss E. P., aged 27, referred ty me by Dr. F. J. V. Krebs, Dec. 1, 1902, lost her voice six months ago. Two months later, without apparent reason, her voice returned. Two months later it again disappeared, and since that time, although much has been done to relieve her, the aphonia persisted. The patient's health had been fair, but she was nervous and easily excited. On attempted phonation the cords would move spasmodically to and fro with a short range about 5 millimeters from the median line and would finally come to rest in the position of complete abduction. Palate and pharynx were anesthetic. After the usual preliminaries I inserted my finger into the larynx and withdrawing it, I ordered her to say "home, home, home!" She responded in a fairly loud voice. As I continued to direct her to say this and other words, I noticed that there was still a tendency to aphonia in that she would quite often whisper the word instead of saying it aloud. I then asked her to sing, "Home, Home, Sweet Home," and with the assistance of my own somewhat discordant tones she sang the song and the aphonia left her. Three months later there was a recurrence, which readily responded to my suggestion which comprehended an inspection of the larynx, an expression which indicated that I understood the condition and the introduction of the finger without comment. Since this she has had no further attack.

XIII.

A CASE OF PRIMARY INVOLVEMENT OF THE JUGULAR BULB, FOLLOWING AN ACUTE OTITIS MEDIA, WITH OPERATION AND RECOVERY.

By J. F. McKernon, M.D.

NEW YORK.

The case was that of a two year old girl, with a history of earache for two days. Examination showed the usual signs of an acute otitis media in both ears, more intense on the left side, with no mastoid symptoms. The left membrane was unusually prominent at the junction of the inferior wall of the bony canal near the tympanic ring.

Both drums were incised, pus escaping from left middle ear, serum only from the right ear. The pus contained a few streptococci, and pneumococci; the serum, staphylococci, and an occasional pneumococcus. Both ears discharged freely and the patient did well until the following evening when the temperature suddenly rose to 103.2 F. Several rises in temperature, with remissions to 98.4° or 100° F., occurred in the next forty-eight hours, and permission was asked to operate. This was refused on the ground that the temperature might be due to malaria, typhoid or pneumonia, and the unlikelihood of sinus trouble, in the absence of mastoid symptoms.

Blood examinations now gave a negative result as to malaria and typhoid, but showed a marked lecuocytosis, and the presence of streptococci. Streptococci were also found in smears from the aural discharge. Exacerbations of temperature continuing, and the child becoming frankly septic, and vomiting, operation was done at the end of 5 days. The left mastoid was first opened and found unaffected; the dura, over the sinus was dark and lustreless; the sinus was easily compressible and did not fill as rapidly as it should. Inciscision into the sinus was next made and a parietal clot, one-half inch long removed, this being followed by free hemorrhage from the distal end, no current coming from below. Incision was continued to the bulb, and a well formed clot over an inchlong, and as thick as anordinary slate pencil, extracted. More broken down clot enveloped in pus was then removed with a wire curette. No bleeding occurred until a probe found the opening into the jugular vein, dislodging a colt in the foramen, when a sharp hemorrhage followed The jugular bulb was kidney shaped, higher than usual, and encroaching on the middle ear cavity.

Exploration of the right mastoid showed it also to be normal, as was the sinus, which was therefore not opened. Recovery was uneventful, from the moment the poison was eliminated. Hearing normal

Microscopic examination of the clot showed a large number of small pus foci, but no bacteria. Culture from same material showed a decided growth of treptococcus pyogenes.

Two other similar cases have been seen by the writer since the above report. In none of these was there evidence of a chill, the only symptoms, besides the acute otitis, being temperature, which was typical of sinus involvement in all.

The author concludes, that with an active, virulent infection of the middle ear, and a large, irregularly shaped jugular bulb encroaching upon it, and these two spaces separated only by a thin, parchment-like wall of bone, it is easier for the infection to pass through this thin partition than by the usual channel, viz: the mastoid. The internal jugular vein was not ligated and resected because free circulation was restored without this measure, and the shorter the time of operations, the better the chances of the patient will be. Results are also better if operation is done during a remission than during a period of high temperature—then there being more reactive power, less depress on and more rapid convalescence.

XIV.

LARYNGITIS HYPOGLOTTICA ACUTA *

By Charles W. Richardson, M. D.,

WASHINGTON, D. C.

There has been no subject in the range of medicine to which I direct my attention that has been so interesting a study to me as that known as laryngitis hypoglottica. This affection occurs in adults as well as in children, but it is rather to the condition as affecting child life that I would in particular direct your attention. Laryngitis hypoglottica is used to designate that more intense form of laryngeal inflammation in which the submucous structures of the larynx participate most actively in the morbid change; frequently showing infiltration, producing swelling into the lumen of the larynx. Those regions of the larynx rich in submucous connective tissue, as the ary-epiglottidean folds, the false cords, and in particular the immediate subcordal portion of the larynx are the areas most frequently affected. The peculiar tendency of this disease to develop the subcordal infiltration with the accompanying impairment of the respiration makes it not only a pathologic condition of great interest, but also alarming in its clinical features, as well as fraught with danger to the life of the affected one. The hypoglottic form of laryngitis as affecting children rarely becomes of much moment when affecting the submucous tissue of the supracordal portion of the larynx. It is only when the condition affects the loose areolar tissues in the subcordal portion of the larynx that our anxiety and fears become aroused. From this fact I have always been inclined to accept the French designation, laryngitis submucosa subcordalis, as the more appropriate term. The etiologic factors, which seem to bring about this condition, are those atmospheric changes that cause acute laryngitis; the acute exanthemata, especially

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measles; influenza; foreign bodies; chemical fumes; inhalation of steam, hot air and smoke. The predisposing cause seems to be that condition described by Potain, and known as lymphatism. Males seem more frequently to be affected than females.

The pathologic changes are characterized by intense inflammatory redness of the affected portion of the larynx, and partial or diffuse, either unilateral or bilateral swelling of the affected portion of the mucous membrane. The effusion into the submucosa seems to be of a highly coagulable nature. It is rarely that the whole larynx is affected.

Symptoms.—The acute hypoglottic type appears primarily under the usual symptoms of a severe acute laryngitis. There is more or less disturbance of the voice, croupy cough, and slight stridulous breathing In children there is slight acceleration of the pulse, increase frequently of the respiration and a moderate rise in the temperature. As the case progresses the breathing becomes embarrassed and the stridor more pronounced. In the supracordal cases the symptoms rarely go beyond this point of moderate embarrassment of the respiration and audible in and expiratory murmur. In those cases, though attended with subglottic infiltration, the breathing becomes more and more difficult, the inspiratory and the expiratory stridor more piping and higher pitched, the cough more frequent and of a more metallic character. All the extraordinary muscles of respiration are called into play, and there is a sinking in of the epigastrium and at the suprasternal notch during inspiration. The child's anxiety and distress are manifested in the usual manner. Cyanosis rapidly supervenes and the pulse becomes small, rapid and thready. Unless relief is afforded at this stage through subsidence of the swelling by natural resolution or through mechanical means the process leads to a fatal termination.

The laryngeal picture presented, when such a view can be obtained, varies according to the affected area. In the supracordal type there is an intense deep redness of the mucosa, while when the false cords are the seat of infiltration, they bulge out so as nearly or quite to overlap the true cords; or when the ary-epiglottidean folds are the seats of the inflammatory activity they show a greater or less increase in dimensions. In the subcordal type the picture is even more strikingly characteristic. The supracordal laryngeal mucosa seems to participate but slightly in the pathoogic change when the subcordal mucosa is involved. Often the cords themselves only show a slight pinkish tinge. On a deep inspiration during inspection the characteristic lesion will show up as two intensely red folds of mucosa, apparently immediately beneath the vocal bands, which are thoroughly immobile during inspiration and expiration. These folds of mucosa vary in size from a slight raising of the mucous membrane, hardly discernible, to masses that almost or quite come in apposition in the middle line. I have, in older children, several times been able to obtain most perfect pictures of the above mentioned condition.

The differential diagnosis between this condition and laryngeal diphtheria is one that cannot always be immediately made. There are slight shades in the subjective symptoms, but they are not constant. In diphtheria the voice is more apt to be very hoarse or aphonic than in hypoglottic laryngitis. In at least six cases I have heard the voice almost normal in hypoglottic laryngitis. In diphtheria the obstruction to breathing is more frequently attended with paroxysms of intense dyspnea, followed by periods of easier respiration. In hypoglottic laryngitis the breathing is not paroxysmally worse, but gradually and progressively grows worse. Laryngeal examination, if possible, shows the characteristic deposit of diphtheria in one form, or the presence of the subglottic swelling in the other. The presence of pharyngeal deposits, when a view cannot be obtained by the laryngeal examination, simplifies the differentiation. The result of a culture will demonstrate the absence or presence of the Klebs-Loeffler bacillus.

Treatment.—Treatment consists in the administration of expectorants, free purgation, the application of ice bag externally, the generation of steam in the room, and the local application or spraying into the larynx of a mild solution of silver one per cent. and suprarenal extract. Should the embarrassment of respiration become great, or the child show exhaustion from the prolonged effort of breathing, intubation or tracheotomy becomes necessary.

It has been my experience to meet with quite a number of these cases, and in closing my paper I will give briefly the history of several, divided arbitrarily into types, enumerating one of each kind.

Case I. A six year old child, not requiring mechanical interfence, referred to me by Dr. H. B. Deale. The boy had had an ordinary acute laryngitis which had been attended with slight stridulous breathing. On the third day of the invasion, as the stridor had become worse instead of better, he was referred to me for opinion. The boy had no temperature. His general condition was excellent. He had a high-pitched inspiratory and expiratory stridor, which was distinctly audible in quiet respiration forty feet distant. Cough distinctly croupy. Voice normal. Laryngeal inspection gave the most perfect picture of subglottic swelling I have ever seen. Several applications of silver resulted in perfect resolution.

Case II. An infant child, not requiring mechanical relief. Seen in consultation with Dr. S. S. Adams. This infant had been sick for several days with a laryngitis and continuous stridor. The stridor had persisted for the twenty-four hours preceding the consultation, increasing slightly during the day over that of the night. The voice, as evidenced by its baby talk and cry, was perfectly clear. Cough croupy. Slight temperature. Inspiratory and expiratory stridor quite marked. Child bright and playful. No cyanosis or other evidence of want of air. Pharynx clear. No laryngeal examination possible. Usual treatment, with complete recovery in twenty-four hours. No culture made.

Case III. A seven-year old girl, requiring mechanical relief, to whom I was called by Dr. R. T. Holden. This girl had had measles. During the convalescence the hypoglottic condition developed. For several days the breathing had grown progressively worse. There was croupy cough and a clear voice. Breathing was very distressing, markedly embarrased, with cyanosis. Epigastric suprasternal and supraclavicular sinking. Immediate intubation. Child extubated in four days. Recovery. Culture negative.

Case IV. An infant child, fourteen months old, with pronounced general symptoms and requiring mechanical relief. I was called to see the patient by Dr. Fry. The child had had an attack of influenza, which had been followed by the evidence of hypoglottic laryngitis. Two days before I saw the infant the invasion of the larynx had taken place. The day before, the breathing had been stridulous and had grown worse that evening. Dr. Bryan saw the case with Dr. Fry the evening of the second day, and suggested the external use of ice. The child, instead of improving during the night, steadily grew worse. At noon the next day, on account of Dr. Bryan's illness, I was called to see the little patient. The little fellow was very much exhausted by his laborious efforts at breathing. He was cyanosed. There was a high-pitched inspiratory and expiratory stridor, croupy cough, and a slightly hoarse cry. There was marked sinking in of epigastrium and suprasternal notch. The child was restless and showed all the evidences of one craving air. Temperature was 101.2, pulse 160, respiration 40. Intubation was immediately done. The temperature curve, as shown by the chrt, ran rather a high course. The child was extubated and the tube introduced on three occasions. On the twelth day the tube was coughed out, and did not require further introduction. The child made a perfect recovery. Culture negative.

Case V. A child of three years of age, demanding mechanical relief, with a fatal termination. I saw this child at the request of Dr. Mallan. It was after twelve at night that I was called to see the child with Dr. Mallan. The boy had been sick for several days with what appeared a simple laryngitis with slight audible respiration. During the twenty-four hours preceding my visit the breathing had become more and more labored. The child's condition demanded immediate relief, which was given through the introduction of an intubation tube. The voice was only slightly hoarse. In order to safeguard the child, antitoxin was also adminstered. Culture proved negative. Child died on the second day after intubation, from pneumonia.

XV.

TINNITUS AURIUM; ETIOLOGY.

By W. Sohier Bryant, M.D.

NEW YORK.

CLASSIFICATION.

Tinnitus aurium may be due to any of the changes causing impaired hearing and to nearly all systemic diseasas and abnormal conditions. For convenience in treating this subject the various forms of tinnitus may be classified under two main headings as follows: I. Objective Tinnitus, when the sound can be heard by the observer with and sometimes without auscultation. It is composed of (a) Vibratory Tinnitus, due to demonstrable sound vibrations. This is divided into (1) External Tinnitus, which has its origin outside the ear, and into (2) Internal Tinnitus, which originates within the ear.

II. Subjective Tinnitus is purely subjective in character and is divided into (a) Phonetic Tinnitus and (b) Neurotic Tinnitus. (a) Phonetic Tinnitus is divided into (1) Peripheral Tinnitus, which has its origin outside the ear, and (2) Aural Tinnitus, which originates within the ear. (b) Neurotic Tinnitus has no sound vibration and is divided into (1) Exaural Tinnitus, originating ouiside the ear, and (2) Endotic Tinnitus, which originates within the ear.

Under (1) External Tinnitus we have tinnitus due to abnormal and pathologically increased somatic sounds, which are divided into (a) Vascular Tinnitus, due to circulatory or vascular sounds. The causes are: 1. Cardiac disease (valvuler lesion); II. Aneurisms of the thoracic vessels; of the basilar, middle meningeal, occiptal, temporal, post-auricular, ophthalmic and carotid arteries (in carotid canal). III. Arterial dilatation of the vessels of the auricle, which may cause blowing sounds synchronous with the pulse. IV. Constriction of arteries, as seen in partial stenosis of of internal carotid (J. Orne Green), V. Constriction of veins; this is sometimes due to tight collars. VI. Tumors pressing on the vessels, as struma, also cicatrices. VII. Goitre. VIII. Abnormal blood tension or volume, including diminished vasomotor tension of the carotids. IX. Abnormalities in the bulb of the jugular or sigmoid simus, causing eddies and vibrations in the blood stream. X. Roughening of the vessels, as in atheroma. XI. Abnormal composition of the blood; that is, anemia, with its venous murmurs and purenemia or lithemia.

Vascular tinnitus often occurs without defect in the sound conducting mechanism, when the vascular sounds are abnormally loud.

(b) Pharyngeal Tinnitus is due to I. Loud mucous sounds caused by the adhesive character of the secretion; snapping and sticky sounds following the separation of opposed surface. II. The pharyngeal muscles, causing voluntary or involuntary contraction noises. III. Friction sounds, due to rotating the head in dry pharyngitis.

(c) Respiratory Tinnitus is due to normal or abnormal respiratory sounds, and is divided into: I. Nasopharyngeal tinnitus, which is due to normal or abnormal respiratory sounds and sounds caused by the escape of a r. Normal respiratory sounds include sneezing and hawking. Abnormal respiratory sounds are due to lymphoid hypertrophies, new growths, morpholigic irregularityof bone or cartilage, hypertrophy of the erectile bodies, adhesions, functional derangement of the erectile tissues with engorgement, functional derangement of the mucus membrane with thick inspissated secretion and extensive loss of tissue in the nose. Sounds caused by abnormal escape of air which comes through the lachrymal duct in atrophic rhinitis, or through a perforated drum membrane. II. Pulmonary tinnitus is caused by coughing, asthmatic sounds, rales and sounds due to partial closure and stricture of the larynx, trachea and bronchi.

(d) Muscular Tinnitus is due to: I. Sounds of mastication, especially snapping of the inter-articular cartileges. II. Sounds of the pharyngeal muscles and deglutition. III. Muscular contraction, myothonia and movement sounds of other muscles near the ear. IV. Snapping sounds, due to movements of the muscles and articulations of the neck, and V. Snapping of the eyelids, an unusual muscular trick.

3. Internal Tinnitus is due to sounds originating in the ear, and is divided into (a) Tubal Tinnitus, due to sounds originating in the Eustachian tube, including: I. Tubal rales, which are made by air entering a tube containing secretion, exudation or foreign fluid, as salt water; with sticky and snappy sounds when the secretion is thick. II. Sounds due to movements of the muscles of the tube. III. Blowing sounds when air enters a clear tube.

(b) Tympanic Tinnitus, due to; I. Voluntary or involuntary contractions of the tensor tympani muscles, causing crackling of an inelastic drum membrane, also tickling or drumming noises. II. Rales heard on inflating a tympanums containing fluid. III. Blowing sounds heard on inflating a a clear tympanum. IV. Succussion sounds due to the movements of thin fluid in the tympanum.

II. Subjective Tinnitus cannot be heard by the observer. It is divided into: A Phonetic Tinnitus, which has, among others, all the causes of objective tinnitus, provided the sound vibrations are too feeble to be heard by the observer; and it is also due to sounds heard because of defects in the sound-conducting apparatus. It is divided into; (1) Exaural Tinnitus, which is divided into (a) Vital Tinnitus, due to normal or abnormal bodily sounds heard because of impairment of the sound-conducting apparatus.

The tinnitus which is due to impaired sound conduction alone arises from the interference with the escape of normal somatic sound from the ear, on account of the resistance offered by the abnormal sound-conducting mechanism. These obstacles chiefly hinder sounds which are normally unheard and have from 16 to 256 vibrations. The tympanum is turned into a resonator for these sounds when the meatus is closed by a rigid drum, foreign body or swelling.

(b) Diplacusis Tinnitus is excited by sound waves and is due to altered character of the sound perception, not of sensory origin. It embraces the following subdivisions, namely: I. Autophonia, when the patient's voice appears to him to be changed in character; probably be to changes in the sound-conducting mechanism. II. Hyperacusis, when sounds naturally agreeable become unpleasant on account of their piercing or reverberating character, probably due chiefly to defect in the sound-conducting mechanism. III. Diplacusis, excited by other sounds; probably due to defect in either the sound-perceptive or conducting mechanism. A false sound is heard as well as the true sound which excites it. There is lack of auditory accommodation in many of these cases. IV. Paracusis, when the sound is heard altered in character or pitch, or appears to be a wholly different sound. This is probably due to defect in the sound-perceiving apparatus, and perhaps also faulty accommodation. V. After-impression tinnitus, like after-images of the eye, are due to strong stimuli and weak nerves. VI. Tinnitus due to a very loud external sound, explosion, or blow on the ear, lasting after the exciting cause has ceased, but always high-pitched and of a character independent of the exciting sound. It is sometimes permanent. It is probably due to the violence of the blow transmitted to the sound perceiving-apparatus, thus causing more or less permanent injury.

2. Endotic tinnitis is due to weak normal or abnormal sounds originating within the ear and for the most part normally either not heard or unheeded. These sounds, owing to an impaired sound-conducting apparatus, may become annoying. This includes: (a) Circulatory tinnitus, due to increased circulatory sounds within the ear. not loud enough to be objective. I. Arterial dilatation of the vessels of the tympanum may cause blowing sounds synchronous with the pulse. An anomalous artery has been noted in the tympanum. II. Vibrations in the small blood vessels of the typanum and inner ear may cause a high pitched vibration or a high pitched tinnitus if the sound is reflected on to the nerve endings.

(b) Myotilitic tinnitus is due to contraction of the tensor tympani and stapedius mucles, and vibrations of the muscles, myophonia, usually intermittent. The tensor tympani muscle causes a low pitched tinnitus which may come and go with rapidity. The hearing is slightly affected by the contraction and it appears to the patient as if the slight loss of hearing was due to the tinnitus. The stapedius muscle causes a very clear high pitched and at the same time a sensation as if an impenetrable veil covered the ear. It often comes quickly and gradually fades out.

(c) Movement tinnitus is due to muscular and other movements, regular, irregular or spasmodic. This form of tinnitus can sometimes be caused by voluntary contraction of the auditory muscles, either as a group or singly. It includes: I. Crackling in the drum membrane, and rubbing sounds. II. Sticky, mucous and snapping sounds due to opening of the Eustachian tube, especially when the secretion is abnormally thick. III. Disturbance of the labyrinth caused by movements of the stapes, producing high pitch tinnitus. IV. Movements of the ossicles, causing tinnitus by their friction. Succussion sounds caused by movements of fluid in the tympanic cavity. V. Vibration of the column of air in the meatus due to wind blowing across it. VI. Sounds in the external meatus, due to the movement of foreign bodies, animate or inanimate.

(d) Somatic tinnitus is caused by the somatic sounds of the ear in cases of impaired sound-conducting apparatus.

B. Neurotic tinnitus has its origin in nervous stimuli not directly dependent on demonstrable sound vibration, and is divided into 1. peripheral tinnitus, which is caused by a series of changes originating outside the ear and comprises (a) reflex tinnitus, which is due to stimulation of the sensory nerves. I. Trigeminal irritation is the most frequent cause of this form of tinnitus, and is produced in several ways. (a) External auditory canal irritation is the commonest of them. (b) Irritation of the nasal mucous membrane. (c) Irritation of the pharyngeal mucous membrane. (d) Toothache, especially of the posterior molars. (e) Irritation of the gums. (f) Neuralgia and hemicrania sometimes have associated tinnitus. The reflex cause of the tinnitus is especially clear if the tinnitus occurs during the neuralgic attack and ends with it. (g) Nasal polypi. (h) Irritation of the bridge of the nose from eyeglasses, has been known to cause tinnitus. (i) The contraction of the muscles of the face may cause tinnitus, probably through reflex contraction of the tympanic muscles. This form of tinnitus is well illustrated by involuntary contraction of the orbicular palpabrarum associated with drumming in the ears, which is stimulated by a bright flash of light, a sudden movement or a blow on the head received or anticipated. A converse reflex is seen in the spasmodic contraction of the orbicularis palpabrarum following a sudden loud sound. Irritation of the facial nerve may cause ticking on the ear. (j) Tinnitus with blethero-spasm. (k) Cramp in the orbicularis and stapedius muscles. (l) Closing the eyes firmly may cause contraction of the tensor tympani muscles. (m) Pressure on the tragus may cause tinnitus. (n) Shaking the head sometimes causes tinnitus. II. Digestive tract irritation chiefly due to (a) intestinal worms, and (b) irritation of the stomach in hunger and dyspepsia. III. Sciatic nerve irritation. IV. General cutaneous irritation, as cold feet, etc.

It is probable that these causes act more through reflex vasomotor changes affecting the whole auditory apparatus, especially the mucles, than by reflex stimulation of the auditory nerve fibres. The vasomotors can cause vibrations and a sensation of sound by changes in the volume and tension of the blood in the sound conducting and perceiving apparatus, thus giving rise to circulatory tinnitus. They may also cause stimulation of the auditory nerve fibres by pressure, direct or through the labyrinthine fluid, or again, they can interfere with the action of the normal sound-conducting apparatus by causing congestion and thus giving rise to tinnitus. Direct irritation of any of the structures of the ear may cause reflex tinnitus.

2. Otic tinnitus is divided into (a) conduction tinnitus, due to disturbances of the sound conducting mechanism from very various causes. This is the most common group of tinnitus. It does not include tinnitus originating from demonstrable sound vibration, whether due to impaired sound conduction or not. It is subdivided into: I. Myringeal tinnitus, due to affections of the membrana tympani. 1. Myringitis: congestion, edema, serious inflammation, hemorrhagic inflammation. 2. Sclerosis. 3. Perforation. 4. Cicatrization. 5. Adhesions. 6. Relaxations. 7. Atrophy. 8. Calcification. 9. Inward displacement, due to unbalanced atmospheric pressure, muscular action or foreign body.

10. Outward displacement, due to expiratory pressure, to pressure of exudation, or exhaustion of the air in the external canal. II. Tubal tinnitus is due to affections of the Eustachian tube. The most common cause of this form of tinnitus is obstruction, usually at the pharyngeal end of the tube, causing intratympanic vacuum, because the mucous lining gradually absorbs the enclosed air, thus causing an inward displacement of the membrana tympani. It also causes increased intratympanic manumetric pressure and outward displacement of the membrana tympani, which may be due to blowing the nose too hard or to congestion of the tympanum, the swelling of the mucous membrane compressing the confined air, or pressure from or retention of tympanic exudate.

1. Congestion, active or passive. 2. Edema. 3. Inflammation. 4. Exudation: serum, mucus pus or blood. 5. Foreign bodies: sea water, etc. 6. Hypertrophies. 7. Organic cicatrices, rare. In the order of frequency they are found first in tympanic, next in pharyngeal end of the tube, least often at the isthmus tubae. 8. New growths. 9. Atrophy, hyperpneumatic tube causing a blowing tinnitus with each respiration. III. Ossicular tinnitus is due to affections of the ossicles and ligaments. 1. Rigidity of the articulations. 2. Ankylosis. 3. Relation of the articulations. 4. Adhesions among the ossicles and to the intratympanic structure. 5. Caries. IV. Mucous tinnitus is due to affections of the tympanic mucous membrane. 1. Congestion. 2. Edema. 3. Inflammation (Catarrhal, serous, purulent, hemorrhagic). 4. Polypi. 5. Sclerosis. 6. Atrophy. 7. Hemorrhage. V. Contraction tinnitus is due to defective action of the tympanic muscles. 1. Spasmodic contractions. 2. Contractures and shortenings. 3. Paralysis.

These are the chief causes of impaired sound accommodation and the presence of diplacusis tinnitus.

VI. Adhesion tinnitus is due to intratympanic adhesions. 1. Organization of exudate. 2. Cicatrization. VII. Fenestral tinnitus is due to affections and disturbances of the fenestra. 1. Impaired motion of the stapes. Impacted stapes, causing a singing, usually a high pitched tinnitus, and impaired motion of the membrana rotunda. 2. Clogging of the fenestrae by products of inflammation, etc.

This group includes the chief causes of impaired overflow of the somatic sounds from within the labyrinth and the resultant high pitched singing, "sizzling" tinnitus.

VIII. Traumatic tinnitus is due to: 1. Foreign bodies, liquids or solids. 2. Wounds of the tympanic contents, incised or contused. IX. Tension tinnitus, due to tension anomalies, includes all the above causes of obstruction to sound conduction and many others of a more delicate character: in fact, everything that in any way affects the acoustic balance.

These cause tinnitus chiefly probably by the interference they make in the dampening function of the ossicular chain, and by irritation of the sound perceiving apparatus owing to interference with the acoustic balance This includes the most difficult cases of conduction tinnitus.

Common causes of this loss of balance are: (1) Anomalies in the tension of the mucous lining of the cavum tympanum, especially the reduplication of mucous membrane described by me elsewhere. These act in three ways: (a) By their weight alone, which is increased by congestion. (b) By their want of elasticity, checking the motion of the ossicular chain. (c) By their contraction, holding the chain in an abnormal position. (2) Abnormal tension of the drum membrane. (3) Abnormal tension of the ossicucular ligament. (4) Incoordinate muscular action interfering with accommodation. X. Meatal tinnitus due to disturbances in the external meatus, caused by (1) Inflammations. (2) Accumulated secretion and exudate, or anything causing pressure on the drum membrane, such as foreign bodies in the meatus. A small hair on the drum is sufficient to make loud tinnitus by interfering with the acoustic balance or by reflex muscular movements due to its presence. It also gives rise to friction sounds on the drum membrane. (3) Exhaustion of air and negative pressure in the meatus, due to its hermetical closure by cicatrices, inflammation, tumors, cerumen, and foreign bodies; and the resulting outward displacement of the drum membrane which may cause very distressing tinnitus and other symptoms more severe than in inward displacement of the membrane. (4) New growths of hypertrophies.

How the foregoing causes give rise to tinnitus is not clearly proven. They probably do so in some of the following ways: (1) By circulatory changes. (2) By direct stimulation of the sound perceiving apparatus through the labyrinthine fluid, brought about by the reflection of the high notes of the vibrations in the skull, or somatic sounds which normally escape through the fenestrae. This is not effective for sounds much above c^4. (3) By reflex irritation and movements of the tympanic muscles.

(b) Reaction tinnitus is due to irritation within the tympanic cavity from any cause not sound vibrations directly stimulating the auditory muscles, vessels, or nerve. The commonest of these causes are:

I. The presence of fluid where normally only air is found. II. Compression of the mucous membrane due to congestion and swelling. III. Irritation of the nerves, due to inflammation. IV. Foreign bodies and new growths.

(c) Sensory tinnitus is due to disturbances of the sound-perceiving apparatus: labyrinth, auditory nerve, and its roots, caused by nerve stimulation independent of sound vibration. This stimulation may be produced by

I. Drugs: Quinine, salicylates, iron, alcohol, tobacco. II. Pressure: Inflammation, tumors and new growths, fractures or contusions, hemorrhages, calcifications, varicosities, colloid degeneration of the auditory nerve. III. Changes in the blood supply: Composition of the blood (toxins) and tension of the blood, trophic changes.

It has been suggested that the sound-perceiving apparatus reacts to stimuli and irritants of various kinds by giving a sensation of high pitched tinnitus c^4 or c^5.

(d) Central tinnitus is a purely nervous affection and occurs without impaired hearing, and has no reflex origin. When it accompanies sensations of light and disturbances of other nerves t suggests carebral disease. It is found in nervous, excited individuals, in over-stimulated mental states, after trouble, in exhaustion, in anemia, after parturition, after loud sounds, occassionally in apparently normal individuals.

The causes of otic tinnitus are identical with the causes of deafness.

SUMMARY OF CLASSIFICATION.

Tinnitus:

- I. Objective.
  - (A) Vibratory.
    - 1. External:
      - (a) Vascular.
      - (b) Pharyngeal.
      - (c) Respiratory.
      - (d) Muscular.
    - 2. Internal:
      - (a) Tubal.
      - (b) Tympanic.
- II. Subjective.
  - (A) Phonetic.
    - 1. Exaural:
      - (a) Vital.
      - (b) Diplacusis.
    - 2. Endotic:
      - (a) Circulatory.
      - (b) Myotilitic.
      - (c) Movement.
      - (d) Somatic.
  - (B) Neurotic.
    - 1. Peripheral:
      - (a) Reflex.
    - 2. Otic.
      - (a) Conduction:
        - I. Myringeal.
        - II. Tubal.
        - III. Ossicular.
        - IV. Mucous.
        - V. Contraction.
        - VI. Adhesion.
        - VII. Fenestral
        - VIII. Traumatic.
        - IX. Tension.
        - X. Meatal.
      - (b) Reaction.
      - (c) Sensory.
      - (d) Central.

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XVI.

ANEURISM OF THYROID ARTERY.

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Man, aged 62, height about 5 feet 5 inches, weight very little over 100 pounds, estimated. Called to see him about 2:30 one morning because of difficult breathing. His symptoms seemed to point to asthma, but after close examination the diagnosis was left in doubt. While inquiring into his history I was informed that he had already had twenty-three doctors since the symptoms first manifested themselves several years ago. The patient was always cheerful during the attacks. He had not the asthmatic hoarseness nor the peculiar characteristic rales so pronounced in asthma. Nearly all of his previous physicians pronounced the condition one of asthma, as did also the gentlemen I met in consultation. I did not agree with this opinion, but could not explain what caused the symptoms. Close inquiry did not elicit any facts which might lead on to causation. Drugs seemed of no particular use since so many had been tried and had failed so I treated the patient topically when he came to the office, not expecting any result. The throat and

larynx and part of the trachea could easily be examined but nothing unusual detected. This condition kept on for several months, when his symptoms became markedly worse. Being satisfied that spasmodic asthma was not the cause of the distressed breathing, I proposed tracheotomy as possibly affording some relief. To this the patient consented and the trachea was opened under cocain anesthesia. This procedure gave him considerable relief, but he gradually grew weaker and died three days later. At the post-mortem we found some thickening in bronchial tubes due to chronic bronchitis. A large mass of clotted blood the size of a man's hand and which looked like liver, was found along the trachea, also a tumor one and a half inches in diameter, apparently attached to the trachea and ready to penetrate by erosion. It had already destroyed the soft tissues between the tracheal rings. This was examined microscopically by Dr. Bentz of the Laboratory at the University of Buffalo and found to be clotted blood. The tumor, situated within the tracheal wall by pressure upon the pneumo-gastric, caused the difficult breathing, simulating spasmodic asthma. The relief after tracheatomy was no doubt due to the bursting of the tumor thereby relieving pressure on the pneumogastric.

Post-mortem diagnosis: Aneurism of thyroid artery.

XVII.

SPONTANEOUS DISCHARGE OF CEREBRO-SPINAL FLUID.

By George F. Cott, M. D.,

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In September, 1899, I removed a ridge from a septum in a young man aged 25. There was more or less hemorrhage for over a week. One evening, while trying to expel some clotted blood, he noticed a slight pain in the left ear, which seemed to him like pressure on the drum head. During the night the pain became very severe, but, after applying heat, a profuse watery discharge suddenly took place, causing immediate cessation of pain. This fluid came away in large quantities and remained clear for several days, when it took on a cloudy appearance. The discharge saturated the cotton which filled the meatus, in fifteen minutes, day or night, and had to be removed constantly. After a week the quantity diminished somewhat, ceasing entirely on the 18th day. Twenty-four hours later it began again and continued until the 27th day, when it ceased entirely and gave no further trouble. The hearing, which was impaired during the discharge, gradually recovered, though it did not become as acute as on the right side. However, it is better than it was before the operation on the nose. He had had a buzzing sound in the left ear for years; this was entirely relieved when the discharge ceased, but has been noticed since then at rare intervals. It was, of course, impossible to estimate the quantity of fluid which escaped, but the patient claims it must have been at least 1/4 pint (probably very much more). The patient is very intelligent and I know he does not overstate the fact. In my opinion, the cause of the discharge was great pressure on the brain fluid in forcibly blowing the the nose, brought to bear over the middle ear, the roof of which remained unossified—not so common an occurrence along the tract of the petro-squamosal fissure. This pressure forced the cerebro-spinal fluid through the fissure, the pain continuing until the drum head ruptured and allowed the fluid to pass through the external meatus. I believe this to be one of those cases of spontaneous discharge of brain fluid about which otologic literature is so conspicuously silent.

XVII.

A CASE OF LABYRINTHINE DISEASE, WITH REMARKS.*

By John K. Sterrett, M. D.

PITTSBURGH, PA.

The case about to be related is of interest more on account of the persistent absence of grave symptoms than to anything unusual in regard to treatment or result.

As far as I can learn the chief sympton of carious or traumatic inflammation of the labyrinth is vertigo, with or without simultaneous nystagmus. (Lucae)

Case.—Miss A.——Family history excellent. Age 19 years, her general health is, and has been always of the very best although she had a slight attack of scarlatina when six years of age.

Patient states positively that she did not have any otitis media until three years after her attack of scarlatina so that her present ear in flammation is of 10 years standing. The discharge during that time was periodic, intervals of one and two years sometimes intervening. Her first attack was mild, as she had little or no pain. Her general health during that period was very good.

Two years ago the patient commenced her last attack of purulent discharge from the right ear, it being the one diseased. Six months after I removed the ossicles or rather their remains as the malleus was fully half necrosed.

At this time which is now about 18 months ago the ear upon examination presented the ordinary appearance of a long standing purulent middle ear inflammation with about half the membrana tympana absent. The patient had no pain, dizziness or tinnitus nor had she experienced any of these symptoms, and her reason for having any operation done was on account of the annoyance of the rather slight, though foul smelling discharge from the ear.

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*Read before the middle section of the American Laryngological, Rhinological and Otological Society, Pittsburgh, Feb. 22, 1904.

The operation did not seem to affect the discharge much although I think it was done as thoroughly as the average, a general anesthetic being given. The foot plate of the stapes was not disturbed but the walls of the middle ear were carefully curretted. No dizziness or tinnitus followed the operation. Until October of last year the patient made occasional visits to my office, and I removed at those times a number of polypi, but could never detect any necrosed bone in the ear. While out of the city Miss A. was seized with a throbbing pain in her ear, during the last of October, 1903. This pain lasted three days and nights and the physician whom she consulted told her after examining the ear that she had taken cold.

Two months later upon her return to the city she came to my office, and I removed a complete bony mold of one of the semicircular canals which I found lying upon the floor of what was the middle ear. Since that time the patient has had no more polypi, and the discharge has ceased.

During all this time the hearing distance for the diseased ear has remained about the same, ordinary conversation being heard at three feet distance. The patient states she hears better when everything is absolutely quiet. Bone conduction while dimished is remarkably good for the forks.

As to the remarks upon this case, while I do not feel able to express a very pronounced opinion, it seems to me that this case should make us more careful in regard to our prognosis and treatment of cases of chronic suppurative otitis media, as I have always been led to believe that we find a train of symptoms such as vertigo, nausea and vomiting, unconsciousness and profound deafness in all or nearly all cases where the internal ear is so much affected as the case just reported.

I wish again to emphasize the fact that this case has had absolutely no vertigo or nausea unless pressure is made over the region of the canals when dizziness is very marked while the pressure continues.

I have in mind three other cases of necrosis of the internal ear alone, one of which was trephined for a cerebellar tumor, one operated upon for an abscess of the middle fossa, and the third for mastoiditis with lateral sinus complication. I could relate several other cases which have come under my own observation, in which the diagnosis was at first very doubtful although appearing plain, but I hope these few will have helped make my point so plain that when we have a chronic suppurative otitis media of long standing we will take into consideration the extension of the disease into the internal ear even if internal ear symptoms are absent, before looking for trouble within the skull cavity.

XIX

LITHEMIC NASO-PHARYNGITIS DUE TO SYSTEMIC DISTURBANCE.*

J. A. Stucky, M. D.,

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In the treatment of all diseases, the facts as to the cause of the existing condition is what concerns us most. What is the matter, and why does it exist, and what will relieve and palliate the condition. are the perplexing questions that we must face.

By the term lithemic naso-pharyngitis is meant that type of disease having a close etiologic relationship to rheumatism, or the so called lithemic diathesis, and having its origin or auto-intoxication caused by the absorption of byproducts from the intestinal tract, or in faulty metabolism occurring in the liver. It may be defined as an acute congestion rather than an inflammatory process.

The local manifestations of this so called diathesis may not be confined to the pharynx but may exhibit itself in affections of the larynx, nasal, auditory, and gastro-intestinal tract without any special organic or systemic symptoms.

The attack causes primarily no lesion, and there is no distinct pathologic alteration, this being a local manifestation of a systemic condition. These cases are neurotic, sedentary, good livers. a snorting, snuffling handkerchief using set, who blame all their ills upon a catarrh.

Little water is drunk, meats and sweets are freely used, the skin is florid or muddy, and constipation exists. A case with such a history leads me to suspect at once indicanuria with probably an excess of uric acid. My observation is that where there is an abundance of indican in the urine in cases such as I have described, there is no permanent relief until it is eliminated. It it not so much a question of diet as regulating the intestinal tract.

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*Abstract of paper read before the Middle Section of the American Rhinological, Laryngological and Otological Society, Pittsburgh, Pa., Feb. 22, 1904.

In aggravated cases I always have the gastric contents analyzed after giving a test meal. For if the contents of the stomach enter the duodenum in a hyperacid condition, intestinal digestion is inhibited, and putrefactive fermentation of the mass results.

Treatment. The chief question to bear in mind is not what drugs to use, but how best to remove the cause, how best to eliminate. Citric, mallic, and the fruit acids should not be used. Where acid drinks are craved, they may be given at meals, with the free use of non-medicated water between meals. Local applications, gargles, etc., are contradicted, although thorough cleansing of the pharynx, tonsils post-nasal spaces, etc., affords marked relief.

The cause of the trouble being within the body, treatment must be directed toward removing the cause, and the first indication is to clean out the alimentary canal. The diet should be restricted, and about six ounces of water be given hourly.

An hour before the evening meal, the colon is flushed with two or three quarts of soap suds, by means of the colon tube and at bed time, eight ounces of warmed olive oil injected through the colon tube, the patient being warned to keep quiet and go to sleep.

As a rule the treatment should be given for four or five days, and then once or twice a week. In a majority of cases observed, the relief has been pronounced, even chronic, intractable cases being given complete relief, not only of the naso-pharyngeal trouble, but of other systemic affections.

The facts of one or more evacuations daily, does not prove that toxic fecal matter is not still retained. Hardened masses may be removed after ten days of treatment.

It is interesting to note the rapid decrease of indican in the urine as shown by the daily tests.

Where there is an excess of uric acid in addition to indican, drugs that will hyperalkinalize the blood, and increase its solvency for urates, are indicated. Mild cases do not need the treatment detailed, but are relieved by alkaline cathartics.

XX

THE TREATMENT OF EAR DISEASES AND OF AURAL VERTIGO IN PARTICULAR WITH LUMBAR PUNCTURE.*

By J. Babinski.

PHYSICIAN TO THE HOSPITAL DE LA PITIE.

Translated by Hanau W. Loeb, A.M., M.D.

We can hardly conceive, at first glance, that lumbar puncture would be capable of exercising an influence upon auricular troubles, and might herefore be tempted *a priori* to reject this method of treatment. It will, on this account not be without interest, I think, to make known the reason which led me to undertake it.

In order to elucidate the sequence of my ideas I should call to mind, at first, certain physiologic facts. When the electrodes of a voltaic apparatus are applied to the temples or to the mastoid processes, one on each side and when an electric current of some milliamperes is passed, there is provoked, among other phenomena, in the normal state a sensation of vertigo, of nausea, nystagmus and a lateral inclination of the head to the positive pole. Moreover, I have shown that by placing,the electrodes in a particular position† a rotation of the head takes place toward the positive pole. The combination of these disturbances has been called "Voltaic Vertigo." What is its mechanism? Until lately physiologists have disagreed on this matter. Some, really the greater number, consider that voltaic vertigo is a reflex perturbation occasioned by electric excitation of the vestibular part of the labyrinth. Others believe that it depends upon the direct irritation of the nerve centers produced by the passage of the current through the brain. In order to settle the question at issue, I made several years ago, some observations which convince me that affections of the ear modify the voltaic vertigo.* I saw, as already noted by Ewald and Pollak, that in bilateral lesions the resistance to voltaic vertigo was often increased that is to say that the production of this vertigo required a current of greater intensity than the normal state and that in certain cases the vertigo was absent even when a very strong current was used. Furthermore, I observed this novel fact that in unilateral lesions the inclination predominated ordinarlly toward the diseased side or operated only on that side whatever the direction of the current, and that the rotation was always limited to one side. Having recognized in the course of my observations that in hysterical deafness the voltaic vertigo is unchanged, I believed it possible to deduce from my observations that the modifications above indicated constituted important signs from the standpoint of the differential diagnosis between hysterical and labyrinthine deafness, which otherwise could not be distinguished by any objective characteristics† At the same time I established that voltaic vertigo is due to an excitation of the labyrinth.

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*From the Annales des Mal. de l'Oreille, du Larynx, du Nezet du Pharynx, February, 1904.

†Sur les movements d'inclination et de rotation de la tete dans le vertige voltaique. (Soc. de biologie, April 25, 1903.)

On the other hand methodical examination, practice before and after puncture upon patients with no other affection besides the ear disease who submitted to lumbar puncture for therapeutic or diagnostic purposes made it possible for me to determine that the withdrawal of a certain quantity of the cephalorachidian fluid diminishes as a rule the resistance to voltaic vertigo.

The following syllogism results from this series of observations: 1. Voltaic vertigo has its origin in the excitation of the labyrinth; 2. Lumbar puncture acts upon voltaic vertigo; 3. Therefore lumbar puncture acts upon the labyrinth.

This action is not unexplainable when we consider that pressure of the labyrinthine fluid may be subordinate in part to that of the cerebrospinal fluid.

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*De l'influence des lesions de l'apparaiel auditif sur le vertige voltaique. (Soc. de biologie, Jan 26, 1901.)

†Sur la valeur semeiologique des perturbations dans le vertige voltaique. (Soc. de neurologie, May 15, 1902.)

It is therefore quite natural to ask whether or not lumbar puncture may exercise a favorable influence upon labyrinthine troubles and it is also quite natural that it should be used as a thereapeutic experiment. According to the best authorities the classic methods of treating the diseases in question are generally not efficacious or but slightly so; on the other hand lumbar puncture is not a dangerous operation which so far as I know has never caused tinnitus, vertigo or deafness and therefore we may consider it harmless in the diseases which we propose to treat. Nevertheless, for greater security, I proceeded with great prudence in removing at the beginning a small quantity of fluid and in putting the patient at complete rest following the operation. I grew bolder little by little when I became convinced that the operation was an innocent one.

I have little to say of the operative technique. I operate in the usual way. I may mention that all the patients were kept in the sitting position during the operation. At the beginning I removed only 4 to 5 cc. of fluid; now I remove from 15 to 20. I recommend that the patients abstain from anything that might cause fatigue for several days following the operation and that they lie down with the head in a horizontal position if any nausea or headache be present.

In the majority of cases a single puncture was made but in several it was performed with advantage two or three times at intervals.

The results which are reported relate exclusively to those collected in my service at the Pitié. All the patients have been examined and followed up from a local point of view by my friend, Dr. G. A. Weill, otologist, whom I must thank for his invaluable collaboration* in 106 cases.

I have already said that lumbar puncture is an inoffensive operation. Patients having ear affections, as others, suffer from pain in the head and nausea for a period seldom exceed-ing a week; they may even complain at the beginning and exceptionally at other times that their ear troubles have been increased but these phenomena are only transitory. I may even state that they are rarer in those suffering from aural disease than in those whose ears are normal, that in many they are entirely absent and that the absence of any appreciable reaction after puncture coincides usually with an absence of all therapeutic action.

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*I must express my obligation for the assistance of a young aurist, Lumineau, who has aided me in my work. Most of the detailed observations of our patients will be found in his inaugural thesis.

I assert that lumbar puncture should never be followed by any general accident nor should it ever aggravate the local state. In performing it therefore there is no infringement of the fundamental medical precept *primo non nocere.*

We have seen that where there is no ear affection present, rachicentesis diminshes the resistance to voltaic vertigo—likewise in other affections. Some do not present these characters, doubtless those in which the vestibular part of the labyrinth is greatly affected. In these, the resistance is not modified after lumbar puncture. On the other hand I have often seen, in patients suffering from ear disease, voltaic vertigo become normal after the operation whereas it had been entirely unilateral from the standpoint of inclination or rotation.

I now come to the essential part of my subject, that which relates to the useful effects of lumbar puncture.

The majority of patients do not observe any amelioration of their condition immediately after the puncture. Some however, generally those suffering from vertigo, state immediately that they are more at ease and that their head is freer. There are also those who hear better. Ordinarily on the next day or the day following, the favorable affects appear, and the vertigo, tinnitus and deafness diminish in spite of pain in the head and nausea caused by the puncture.

But we must not be in haste in such cases to claim a victory. It is not uncommon for tinnitus and deafness after being diminished for some days to reappear at the time when the effects of the operation disappear. We can understand that these cases may be easily explained upon the ground that the cerebro-spinal fluid is rapidly reproduced. It is singular that the results may persist long after the rachicentesis although the fluid has probably reaccumulated;

that they may be even accentuated; this can not be doubted as we shall see. I pass in successive review the three essential subjective ear troubles, vertigo, tinnitus and deafness, making thus a symptomatic classification and I will show the effect of the lumbar puncture upon each of these symptoms.

Of these three manifestations, vertigo surely is the one most frequently and markedly influenced by rachicentesis. 32 of the 106 cases observed were affected with vertigo, paroxysmal in some and continuous in others. In some cases the vertigo was accompanied with violent tinnitus and nausea presenting the classic symptom-complex of Ménière, in other cases it consisted only of a sensation of instability appearing after certain movements and manifesting itself in staggering. But I intend to show in view of the confusion of terms that the word vertigo is employed in its exact sense and although the vertigo was more or less intense, continuous or intermittent, in the various patients, it was in all very characteristic. Of the 32 cases, lumbar puncture was performed in eleven without success. A very satisfactory result was obtained in the other 21 cases, at times altogether remarkable. Seven of the cases relieved of the vertigo remained well for six months at least and one for 13 months. In order to give an exact idea of the effect of the rachicentesis, I think it best to present the various observations in resumé:

OBSERVATIONS.

Case 1.—57 years of age; pure affection of the labyrinth; auricular troubles for 8 or 9 months; tinnitus and whistling sounds continually on the left side; decided diminution of hearing on the same side; vertigo upon the slightest movement; mental depression. A single puncture was followed after ten days by a disappearance of the mental condition, vertigo, whistling sounds and by considerable diminution of the tinnitus and deafness. This result has continued for thirteen months.

Case II.—37 years of age; adhesive otitis consecutive to acute otitis media on the right side; evident petro-mas toid trouble for six years; during this time deafness almost complete and tinnitus; for three weeks increase of tinnitus and vertigo; some days after rachicentesis, the tinnitus and vertigo disappeared, the deafness decreased and is still decreasing. This result has continued for nine months.

Case III.—39 years of age; adhesive otitis consecutive to acute suppurative inflammation of the left ear for six years; during this period deafness complete on left side tinnitus, attacks of vertigo with neausea and falling; for five months considerable accentuation of the vertigo, tinnitus and confusion of intellect; several days after the rachicentesis an amelioration manifested itself and progressively increased; at the end of a month considerable diminution of deafness, disappearance of tinnitus, of vertigo and mental trouble; later following a slight operation upon the middle ear by an aurist of the city, the tinnitus reappeared; but the result with reference to audition and vertigo has continued for nine months.

Case IV.—63 years of age; pure affection of the labyrinth consecutive to a fall from a horse five years before; for four years attacks of vertigo with tinnitus, nausea and staggering; for two years vertiginous state constant, attacks repeated 5 or 6 times a day; tinnitus continuous, diminution of hearing; lumbar puncture followed by an immediate amelioration and ten days later, vertigo, tinnitus and deafness disappeared; this result has been maintained for seven months.

Case V.—53 years of age; pure affection of the labyrinth; for one year, continual vertigo, increased by sudden movements; continual tinnitus greatly aggravated during the vertigo; rapid improvement after puncture; eight days later disappearance of tinnitus and vertigo; the result has continued for seven moths.

Case VI.—36 years of age; progressive sclerosis of both ears; feebleness of hearing; for three years continual tinnitus and vertigo; after puncture, disappearance of vertigo which has not reappeared for six months.

Case VII.—35 years of age; progressive bilateral sclerosis; great diminution of hearing; for one year continual tinnitus and attacks of vertigo; after puncture, tinnitus decreased and vertigo disappeared; this result has continued for six months.

In the second group I place four cases relieved from vertigo with which they were attacked and in whom the cure continued for three months; one suffering from a pure labyrinthine lesion increasing for twenty years had for 18 months continual vertigo; the second also suffering from a pure labyrinthine lesion had had vertigo for one week only; the third suffering from adhesive otitis, for several years, had vertigo which was at first intermittent and later became continuous; the fourth suffering from dry otitis had attacks of vertigo with tinnitus and nausea several times a day.

A third group consists of seven cases which disappeared and whose actual state we do not know. We can only say that during the period in which they were under observation varying from 15 to 40 days, the relief continued; one of these cases had a pure labyrinthine lesion, two a adhesive otitis and the fourth a dry otitis.

Finally, in the fourth group, I include three cases, of whom one suffering from dry otitis with vertigo, has been free from vertigo for five months which however had a tendency to reappear. A second with adhesive otitis has had a sensible amelioration which however has decreased. The third, with dry otitis has only shown a slight but perceptible improvement which has lasted for five months.

If we may judge by these statistics, we may say that in the treatment of vertigo by rachicentesis, success is the rule and failure the exception. I know of course that it may be claimed that I have had a series of very favorable cases, that lack of success or partial success is perhaps more common than my statistics tend to establish and furthermore that my patients particularly those in whom the vertigo disappeared have been under observation only a few weeks and can not be considered as definite cures. Nevertheless the results obtained, whatever the future may be, are important especially if it is remembered that other methods employed in like cases are of little value or absolutely useless.

The symptom, tinnitus, is certainly much more rebellious to treatment than vertigo. In ninety cases, there were thirty in whom the trouble diminished appreciably or disappeared and among these there were ten in whom the results continued for three months or less; some even remained cured for a longer time, seven months, ten months, thirteen months. It is true that among the twenty others there are certain patients who were not under observation more than one month. However this result is still satisfactory compared to that obtained by the usual methods of inflation, bougieing which, in contrast with rachiecentesis, may increase the tinnitus.

Finally deafness is perhaps still more rebellious to rachicentesis than tinnitus. If I deduct the cases in which an improvement of one or more weeks was followed by a return of the previous state and those in which in spite of the statements of the patients, perhaps too optimistic, the result did not seem to me altogether incontestible, only 13 out of 100 cases of deafness remain in whom I was able to obtain an improvement, but these were manifest. It was recognized by the patients, their families, my collaborators and myself, thanks to comparison of examinations made before and after puncture. The following are some brilliant examples of success:

A woman with an attack of complete deafness of one ear for six years following a suppuration, recovered her hearing shortly after puncture so that she heard whispering at two metres. This result has continued for nine months. A man who had an otosclerosis, being completely deaf for 20 years was decidedly improved after puncture; to his great astonishment, he heard noises which he could not hear before and he can hear what is said to him by one speaking in a loud voice close to him.

Finally a man aged 35 years, a deafmute since he was two and a half years old, absolutely deaf in one ear and almost absolutely deaf in the other, having tried every imaginable treatment without success submitted to three successive punctures, the first without result, the second followed by a slight amelioration, which was increased by the third. Today he hears loud voice spoken at 20 centimetres distant on the side which seemed to be absolutely nil as to hearing. At the same time there has been a modification of his voice which presented the characteristics of that of a deafmute.

This observation is further interesting because it shows we should not give up hope when a single puncture is without effect. If all the patients whom I have classed as unsuccessful had been subjected to puncture several times, my statistics would perhaps show fewer failures.

I should remark that deafness has been improved especially in those patients who had vertigo and tinnitus at the same time; monosymptomatic deafness is particularly refractory. I would add that although, in the hierarchy which we have have established, vertigo occupies the first place, tinnitus the second and deafness the third, we observe exceptionally in some cases diminution of deafness more pronounced than that of the tinnitus or even of the vertigo.

If now I make a classification of cases founded not upon the character of the subjective symptoms but upon the nature and seat of the lesions, I count eight pure affections of the labyrinth, twenty-two of adhesive otitis and seventy-six of dry otitis. From this standpoint I find that pure affections of the labyrinth are best acted upon by puncture; of the eight cases comprising this group, six were greatly improved or cured. I should observe, however, that in none of these cases was it a question of complete deafness as the deafness was in a majority of these cases but slightly pronounced and the dominant symptoms were those of irritation of the labyrinth characterized by vertigo and tinnitus.

Rachicentesis appears to have more action on auricular troubles when they are associated with a adhesive otitis than when they are dependent on a dry otitis. The difference seems more appreciable if we consider the symptom tinnitus which in twenty-two cases of adhesive otitis was happily modified ten times.

I think that I am authorized by the analysis of my cases to draw the following conclusions: Rachicentesis exercises a remarkable influence upon auricular vertigo; ordinarly it is lessened or disappears. It may act favorably upon other auricular troubles such as tinnitus and deafness but in these its action is less extensive. Rachicentesis is generally more efficacious in pure labyrinthine lesions than in mixed lesions of the ear and usually more efficient in adhesiye otitis than in dry otitis.

A rachicentesis is not dangerous and does not expose those who submit to it to any aggravation, it may be used except under special contradictions upon all those affected with ear disease which has been refractory to the various methods of local treatment.

XXI.

ON A CASE OF APHTHOUS LARYNGITIS.*

E. J. Moure. M.D.

BORDEAUX, FRANCE.

TRANSLATED BY CHEVALIER JACKSON, M.D.

The occurrence of aphthous ulcerations in the mouth, and even in the pharynx, is so well known to all practitioners that it would be useless to describe this lesion. Suffice it to say that it is characterized by the presence of little erosions generally cupule-shaped and oval, occupying the internal surface of the cheeks, the lips and the edges of the tongue.

The eruption is usually quite discrete and occurs in crops which are quite ephemeral lasting 24 to 48 hours. In some patients successive crops of aphthous erosions may be observed, being produced by any food that is even slightly spiced or irritating, and especially by fish, shell fish, high game and preserves.

On the other hand, aphthous erosions of the laryngeal mucous membrane are much less known and seem to be very much rarer, on this account I believe it my duty to report the followfng observations:

M le. X., 23 or 24 years of age, consulted me at the "Clinique Laryngologique de la Faculte," in the latter part of December, complaining of intense dysphagia, being able to swallow saliva and liquids only with great difficulty. Wines and bouillon especially smarted intensely as they passed down. This painful state had lasted 48 hours, in spite of various gargles prescribed by the attending physician. There were no fever or other constitutional symptoms. There were no lesion discoverable externally; no adenopathy; no tenderness on pressure externally on the neck; and the examination of the mouth and pharynx was negative. But, on laryngoscopy,

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*Communication to the meeting of the Middle Section of the American Laryngological, Rhinological and Otological Society of Pittsburgh, Pa., Feb. 22, 1904.

I discovered on the base of the tongue, at the site of the lingual tonsil, and on the free border of the epiglottis, several cupule-shaped small erosions, transversely elongated, covered with a grayish opaline coating and surrounded by a somewhat reddish areola outlined against the surrounding healthy mucosa. I at once suspected the trouble to be an aphthoid condition of the base of the tongue and of the larynx and interrogated her in regard to aphtha in the mouth. I then learnd that she had been subject to attacks of apthous erosions, and that recently she had had them on the internal surface of the lower lip and side of the tongue. She could not attribute the present attack to anything. I had one of the students of the Clinique apply to the affected region a twenty per cent. solution of silver nitrate, prescribed an alkaline gargle and ordered a regimen of milk,eggs and Vichy water, requesting the patient to return. Two days later, when she presented herself again for examination, the local painful symptoms had completely disappeared and swallowing was normal. Laryngoscopic examination revealed a scarcely discernable redness at the sight of the erosions, in a word the normal mucosa was restored.

I have not since seen the patient, which leaves me to suppose that she is completely cured of the eruption.

The foregoing sufficiently indicates the symptomatology of the affection without further elucidation, the principal trouble consisting of a very intense dysphagia, severely painful, especially on swallowing either of saliva or of food, particularly w nes and boullion. In some cases I have seen the dysphagia so severe as to interfere with alimentation. I remember one case, a confrere, who came to consult me in great distress and perplexity, because during the preceding 24 hours he had been unable to swallow anything so great was the pain on deglutition. In this case, also, I discovered an aphthous erosion on the tip of the epiglottis which rapidly disappeared under the application of argentic nitrate.

The observations merit reporting, I believe, because a description of such cases is not to be found in the classical books; and on this account I wish to call the attention of my transatlantic confreres to this special point in laryngeal pathology.

XXII.

MANUEL GARCIA.*

FELIX SEMON.

LONDON, MARCH 17, 1904.

On this day the father of Laryngology enters upon his 100th year.

The laryngologists of the whole world join in the hearty wish that our Master may celebrate his hundreth birthday and many more in the same remarkable and physical freshness and strength in which his 99th birthday finds him. *Quod bonum felix, faustumque sit!*

The London Laryngological Society, whose oldest honorary member is Manuel Garcia, has appointed a committee consisting of its present and former presidents, for the proper celebration of his 100th birthday March 17, 1905.

The committee decided upon the following at its first meeting.

To deliver an address to the honored one on the day of the celebration.

To co-operate with other laryngological and musical societies for the double purpose of getting together a testimonial as a perpetual souvenir of this rare jubilee, and of arranging a banquet for the evening of the day of the celebration, where it is hoped that the one honored would be present.

A tentative inquiry of his wife showed that his family wished the souvenir to take the form of his picture, and we believe that this idea will be received with approbation by those who will take part in giving it. A portrait that shows the founder of laryngoscopy in his 100th year will be not only of historical value, but reproduced in engraving or photograph would be an ornament to the assembly rooms of all laryngologic societies, as well as the consultation rooms of the laryngologists of every nation.

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*From the Intra Centralbl. for Laryngol, Vol. XX, No. 6.

The committee of the London Laryngological Society will soon communicate with the other laryngological societies of the world, some of which will certainly want to take part as a society, as it is desired that the collection for the testimonial not only be started as soon as possible, but finished, in order to make arrangements with the painter to whom is to be given the preparation of the portrait.

The present communication is only a preliminary one.

PROCEEDINGS OF THE MEETING OF THE MIDDLE SECTION OF THE AMERICAN LARYNGOLOGICAL, RHINOLOGICAL AND OTOLOGICAL SOCIETY, HELD AT PITTSBURGH, PA., FEBRUARY 22, 1904.

The Chairman, Dr. Chevalier Jackson, on behalf of the Pittsburg members, in a few happy and well chosen words, welcomed the members to Pittsburg. He called attention to the number and eminence of the members present, and to the program, evidence of the good work that can be done by the sections. He said he preferred not to intrude a long opening address, which would only delay the hearing of better things, better said, by better men.

Cholesteatomatous Disease of the Tonsils.

By Dr. Norval H. Pierce, Chicago, Illinois. See page 36.

DISCUSSION.

Dr. J. A. Stucky, Lexington:—I did not know before that the tonsil had an appendix. I suppose all have seen a number of these cases which are sometimes a source of embarrassment and annoyance to the patient as well as to the physician. I never thought to call it cholesteatoma. I had not associated the word with anything which had an odor such as these cheesy masses in the tonsil, and Dr. Pierce's paper not only strikes me as being unique and interesting, but suggestive and therefore profitable.

The only point that I desire to mention is this: How best to get rid of the cause of these troubles. He mentions slitting the sac, and cutting it out, but that, even in the hands of the most careful operator, is a little risky. Many mention the use of nitrate of silver, which we have all tried, and we have tried chromic acid, and also the galvanocautery, but have given that to the shelf where I think it belongs. I have tried in the last few months the slitting up of the sac and cleansing the membrane thoroughly and then the daily application for about a week of argyrol, unsaturated solution. It has given me better results than anything else, but I cannot explain the mode of its action. I do not know what causes the ordor, but suppose it is the decomposition and putrefaction.

In regard to the hemorrhage, some cases bleed and the Lord only knows why, and he is reticent on that point. I have seen them bleed after operations by the best men in the country, and after a cold wire snare and galvanocautery. I saw one bleed in Cincinnati a few weeks ago, where the work was done as nicely as any I ever saw. A few nights ago a colleague called me up with a hemorrhage from a tonsil which he had removed a few days before. I looked carefully for the cause of the hemorrhage, and did not find the condition of affairs in the fascia that Dr. Pierce speaks of, but the patient bled. I have seen several cases and I never saw better results obtained than from chromic acid, fused on a probe. We have tried the hemostatics, adrenalin chloride, etc.

Dr. C. A. Richardson, Washington:—I would like to say a few words on Dr. Pierce's pa per This paper of Dr. Pierce's is most interesting and reaches something in which we are all interested. This cholesteatomatous formation of the tonsil is one which cannot always be diagnosed before the tonsillar flap is opened. I remember some years ago I had a patient who was about to be married and who was disturbed about the odor of his breath. I could find no reason to account for the odor. He went to New York and Philadelphia as his duties called him, and about a year afterward he came back to me. His tonsils were not much enlarged and appeared normal in every way, but I opened the capsule and found deep within the tonsil large cholesteatomatous masses which had an intensely disagreeable odor. Excision of the tonsil resulted in complete relief. I have observed this condition of the tonsils again and again. I have been surprised at times finding these large cholesteatomatous masses where there was no evidence externally. The point I wish to bring out is that it is not always evident on the surface of the tonsil that these masses exist in the crypts and folds.

I was interested in Dr. Stucky's remark in regard to the use of argyrol. I cannot agree with him at all, and I cannot see where it would be of any value. I have used this agent in solution from 5 to 30 per cent. and have been uniformly disappointed and cannot see how it would be of any value whatever

Dr. G. Hudson Makuen, Philadelphia:—I have been interested in the subject of this paper for a long time. In the first years of my study of the diseases of the throat I recognized the importance of getting rid of these little receptacles in the tonsillar niche. While I did not go into the subject as thoroughly as Dr. Pierce has done I had made two knives which had the cutting surface at right angles to the shaft. I think I exhibited these to this society the first time it met in Washington.

Our chairman, Dr. Jackson, has devised similar knives, but mine differs from them in having sharp points. Danger may lie in the point of the knife if due care is not taken. I insert it into the fossa or crypt, bury it in the most dependent part, and then bring it out toward the middle line of the pharynx, opening up the pockets entirely. To keep the pockets open I scar the edges of the wound with the actual cautery. I have seen much good come from the above treatment of these conditions.

Dr. H. W. Loeb, St. Louis:—I should like to ask the essayist if he has succeeded in finding cholesterin in the masses The method of treatment is to open up the sacs to as great extent as possible and maintain the opening and cause obliteration as far as possible of the limiting walls. To me it seems to be impossible to maintain this opening by simply making a slit unless something is done to prevent the contact of the two sides. My practice has been to use the electrocautery knife. I prefer to do it with a simple knife if possible, but to me it does not seem likely that the opening can be maintained after making a mere slit. With the electrocautery it is possible to destroy a portion of the limiting walls of the cavity. I think the subject is exceedingly interesting, and it speaks very well to have the President of our section bring up this important subject, which is being studied so extensively.

Dr. Pierce:—I first open the sac thoroughly, then curette it with a sharp curette, and then I fill the cavity with a thirty-five per cent. solution or saturated solution of argyrol.

In regard to cholesterin crystals, they are found in the masses. It is a question if they are always present, but they have been found.

In regard to keeping the spaces open the whole subject is embraced in just that point. Personally I have had more success by tearing them open the fifth, tenth or twentieth day, after first incising them and after the bleeding ceases I use nitrate of silver, fused on a copper probe or a cautery for the cut surface. These cavities are not obliterated. The tonsil is removed, and the epithelium lining the crypts or cavities joins the epithelium from the surface of the tonsil. Staining this cholestetomatous tissue is difficult. In fact there has been no satisfactory staining. If we should study the tonsils with a view of finding out the exact nature of the disease, I think we would reach unexpected conclusions.

This tissue is capable of invading the tonsillar tissue just as choleasteatoma in the mastoid antrum is capable of invading the bone. There is much to be discovered and learned in this direction.

Report of a Case of Tonsilith.

By Dr. John S. Mabon, of Pittsburgh.

The only interest connected with this case is the exhibition of the specimen, as the history is extremely meager, and I cannot exhibit the patient. This man, who was fifty-four years of age, presented himself at my office and said he had an interesting scientific specimen, which he, himself, had removed from his throat. He had complained for three months of a sore throat, frequent coughing, and often emesis from clearing the throat. He had once a very severe attack and expectorated the specimen from the throat. The only thing I could find on examination was the peculiar appearance of the arch on the right side, and introducing my finger, I found the cavity large enough to insert the end of my finger. My intention was to have a section made and the findings sufficient to make an analysis, but the expert chemist said it was not large enough to make the examination. He thought it was composed of the chlorid and phosphate of lime. I had thought to have seen the patient again, but he did not present himself. He took the specimen from the mouth himself. The weight of it is one hundred and forty-seven grains.

DISCUSSION.

Dr. J. A. Stucky, Lexington:—The largest stone I ever saw was not near as large as a small pea, and I have nothing to add to this. I cannot account for it. I do no see how the man could get along with it in his throat.

On a Case of Aphthous Laryngitis.

By Dr. E. J. Moure, of Bordeaux, France. See Page 139.

Systemic Treatment of Naso-Pharyngeal Irritation.

By J. A. Stucky, of Lexington, Ky. See page 127.

DISCUSSION.

Dr. Wendell C. Phillips, New York:—Mr. Chairman, I must congratulate the reader for his attention to this subject and there will be little criticism in what I have to say. There is much more to the treatment of naso-pharyngeal inflammation both acute and sub-acute, than the application of sprays, astringents, etc. Experience is leading me to believe that remedies used for applications to the membranes do more harm than good and that only mild applications should be used, and I am inclined to think that internal treatment is more efficacious. Dr. Stucky has clearly described the character of this class of inflammations. Draughts of air receive more blame for colds than they should. Fatigue is oftener a cause of colds than exposure to draughts.

I have recently been treating a patient who was rapidly losing her hearing with severe tinnitus. She is a high liver, and takes practically no exercise at all. She complained of pain at the base of the brain. I recommended physical exercise. She took a long walk which was followed by excruciating pain at the base of the brain. I feared apoplexy and so thought that kind of exercise would not do, but recommended milder exercise and internally a solution of salicylate of soda made from Merck's oil of wintergreen, thirty grains daily. I cauterized her Eustachian tubes, regularly and gave special directions to her exercise; stopped the use of stimulants; and continued the internal use of the salicylate of soda. The result has been that her tinnitus is well and the pain at the base of the brain is gone. Cheerfulness has replaced her depression, and hopefulness has inspired her. Her endurance has greatly increased and she has given up the idea that she is going to become perfectly deaf. The result has largely come from the administration of salicylate of soda and exercise. The method of Dr. Stucky is good but largely impractical, because most patients are so busy that they prefer some treatment which requires less time, and most cases may be cured by simple means.

Dr. T. P. Berens, New York:—I would like to thank Dr. Stucky for his able paper and hope he will keep pounding it out to prevent our getting into the rut of only local applications and nose douching.

As Dr. Phillips has remarked very aptly we do not get this disease as well marked in New York and Philadelphia as they do in Kentucky. I have seen no cases where it was necessary to put the patient in the hospital for a week or two. Climate, diet and hygiene surroundings have much to do with these things, and it is possible that the amount and variety of food and drink and the climate, together, have something to do with the nonelimination and may probably cause a much more severe type of pharyngitis in Kentucky than we have in New York or Pittsburgh. In speaking with Dr. Phillips of a similar condition he asked me what local application I used. I told him mercury and chalk thrown up into the back af the throat, together with the administration of some saline the next morning. Sometimes I have used the calomel and chalk preparation for the throat, and individually I prefer this application.

There is another class of cases that Dr. Stucky just mentioned, and that is where the patient complains of a sensation as of cinders, fish bones, or bread crumbs stuck in the throat or tonsil. These cases are similar to such a condition as Dr. Pierce described to-day. They may have a little accretion in the tonsil or they may have some other condition in the naso-pharynx, which will require attention. While giving this attention do not forget the little gray powder occasions ally, and if the patients have been brought up under some other school than ours you will not hurt their sensibilities.

Dr. C. W. Richardson, Washington:—This subject is an interesting and important one. I think we all have noticed the great importance of systemic medication in most of these cases.

Dr. Berens and Dr. Phillips live in a state where there is a continual rush, and men have only time there to eat and to work, all else must give way. We men who live in rural districts find that the patient is willing to give up a little to get well, and will submit to lines of treatment which we prescribe. I think if the doctor would suffer from some of these diseases, he would recognize how willing the patient is to overcome them. Last spring I was affected with a condition which the reader has not referred to, and that was a neurasthenic vasomotor catarrh, which afflicted me nearly six months. I know of nothing so distressing and annoying as to retire after the days work with the hope of a restful night, to be awakened with a complete vasomotor stasis in the nasal chamber, or by a violent laryngeal spasm and a distressing cough. I think anyone who suffers with this or the other type will readily see how willing the patient is to submit to any form of treatment to relieve these conditions. I think we pay too little attention to these various forms of systemic infection with local manifestation and attempt to do too much in a local way when the treatment should be largely of a systemic character. We meet besides these catarrhal conditions of the nasal tract, those neurasthenic cases which also demand a special form of systemic treatment. We can relieve to a certain extent this vaso-motor stasis by local applications, but it is not enduring and permanent in its effects. There is only one course of treatment which will relieve these individuals and that is of a systemic character. Their work should be cut down and their nervous waste should be arrested, they should be given more out of door life and other general treatment, which we all know are applicable to these cases. Without this we cannot bring about a restitution to the normal condition either in a local or a general way.

Dr. W. S. Bryant, New York:—I think Dr. Stucky did not mention one of the chief causes of lithemia, and that is nervous exhaustion. This is one of the most prevalent causes in the east.

Dr. Stucky's method of treatment, I think, if followed out would lessen in a marked degree the cases of middle ear catarrh. Dr. Phillips hinted at this fact, I think, that if prophylaxis as far as the middle ear is concerned were followed out that probably fifty or seventy-five per cent. of the chronic catarrh condition of the ear would be done away with.

Dr. H. W. Loeb, St. Louis:—I think these well recorded memoranda on the on the part of the essayist deserve close attention. The essayist has made these observations in a careful and systematic manner, and has succeeded in finding indicanuria present in nearly all cases, and I think that is an important matter. Here is a proposition in which an acute or sub-acute naso-pharyngitis is accompanied invariably by indicanuria, which the essayist thinks significant of auto-intoxication. Now, this is getting down to the basis of the trouble, and for that reason, whether or not Dr. Stucky's observations are confirmed, he will have the merit of suggesting the local expression of a general condition.

It is possible that patients are particularly prone to this sort of pharyngitis in Kentucky, where whiskey drinking is common. In beer drinking communities, it is far more uncommon though it does occur when beer is drunk in excess and for a long time.

Dr. Stucky:—I think some of my most remarkable cases have been from the east, from New York and Pennsylvania. The worst cases are not indigenous to Kentucky.

Regarding the point made by Dr. Phillips about the use of salicylate of soda, most of you recall the fact that I am a warm advocate of this drug, but I think if you would use salicylate of stontium you would like it better.

If the patient really wants to get well I believe you can get better results in ten days with the treatment I outlined than in ten weeks under other treatment. If the patient wants to get well he is willing to pay a trained nurse or go the hospital and spend the night. They do not object to the treatment as the relief and comfort is so marked. I have never had a patient complain.

I am glad Dr. Richardson spoke of the neurasthenic vaso-moto disturbance. He did not get the condition in Kentucky, as he came there with it. Now as to the cause of the vaso-motor trouble the neurasthenia is not the cause of the lithemic condition, but the same cause produces both. I do not know much about indican, but I know that when we find it and get rid of it the patient is relieved.

When I suspect a case of naso-pharyngeal irritation I always have an examination of urine made for indicanuria.

Report of a Case of Primary Involvement of the Sigmoid Sinus Following an Acute Otitis. Operation. Recovery.

Paper by Dr. James F. McKernon of New York. See page 104.

Report of a Case of Infective Sigmoid and Lateral Simus-Thrombosis. Operation Jugular Exsection.

Paper by Dr. Ewing W. Day of Pittsburgh. See page 19.

DISCUSSION OF THE TWO FOREGOING PAPERS.

Dr. N. H. Pierce, Chicago:—Mr. President and Gentlemen: These two fortunate cases should make the operators very proud, as they do not all terminate so favorably.

Regarding the case reported by Dr. McKernon, the title is misleading. It is a primary isolated thrombosis of the jugular bulb with extension to the sigmoid sinus.

Regarding the absence of chill and desudation in both of these cases I would say I believe it is rather peculiar to children in septic conditions that these two symptoms are less frequently present than in adults. We very frequently miss the chill and the sweat, and it is important to remember this as we are liable to be misled if we look for these two symptoms as being constant in children.

The other point with which I will close is the postoperative temperature in Dr. Day's case. I think it is very rare, if ever, that we have such extensive involvement of the cephalic veins with no postoperative rise of temperature.

I remember a case of my own which recovered and which ran a temperature of 101-103 from the time of the operation until he got out of bed, which was three or four weeks.

We cannot eliminate septic material entirely by our operation, and nature helps us out with the sepsis, and more or less elevation of temperature is always to be expected. I believe every case should be examined for the bacteriologic findings at time of the first visit. I make not only smears but gelatin tube culture in each case. I believe the prognosis and after-treatment will be greatly aided in this way. Lately there are appearing some articles which tend to throw doubt on the value of the information derived from bachteriologic examinations of ear disease, but my experience leads me to believe that such an examination is of great assistance.

Dr. W. C. Phillips, New York:—I would like to call attention to two points. First, that Dr. McKernon did not attempt resection of the jugular vein. He was sure that infection had gone into the general circulation, and also that resection of the internal jugular vein in a young child is attended with grave consequences. I believe Dr. McKernon was wise, and I shall always do this if the symptoms do not show involvement further down. We should be careful how we resect the jugular vein in children. I have seen it done several times but never saw one get well.

The other point is with reference to the examination of the pus in these cases.

We should get the pus as early as possible, if we wish to have bacteriologic examination made.

Dr. T. P. Berens, New York:—I congratulate Dr. McKernon on his success. It seems to me, however, that the best surgery in dealing with cases of sinus thrombosis is to cut off the general circulation by ligating the veins before attempting to disturb the clot by curetting it from the sinus.

I have removed the jugular vein from a baby nine months old, and the shock was absolutely nil. I have seen children under three years of age with septic thrombosis of the lateral sinus get well after the vein was removed, and I do not think the shock was great.

Tinnitus Aurium.

Paper by Dr. W. S. Bryant. See page 111.

DISCUSSION.

Dr. H. W. Loeb, St. Louis:—There is a very little in this paper to discuss, except to state that the classification is very ingenious and seems to cover every point.

The question for discussion would be whether or not the classification given is along the lines we would expect in such a symptom as this. It certainly enters into a deeper classification of tinnitus than I have been able to do myself. I would like to state that Babinski, a French neurologist, has been affecting some good in tinnitus by lumbar puncture.

Dr. J. A. Stucky:—I would like to ask a question concerning a very peculiar case and would like to know what is the matter and what to do with it. The young man is an athlete, twenty-one of age, and healthy in avery respect though of a very neurotic temperament. He complains of a constant buzzing noise in his ear when he is alone. I can find no trouble in the ear. There is a little thickening on the floor of the nose, but not enough to interfere with drainage and ventilation of the tympanic cavity. This is worrying him considerably.

While reading your paper I was wondering under what head I would put this fellow. Is it a pshychic trouble or is the trouble organic? He has had it six or eight months.

Dr. W. S. Bryant:—Referring to Dr. Stucky's attempt to make the diagnosis, I think the only way it can be done is by elimination. If we rule on the condition of the pharynx and lithemia and rule out the disease of the middle ear and the labyrinth then we come to the nerve. If we follow along the nerve we come to the psychic functions. I think Dr. Stucky said his patient has some sort of neurosis.

This condition has often much to do with the gravity of the symptoms of the tinnitus. If the patient is not nervous I think the tinnitus does not worry him very much, but the more he listens to it the louder it grows, and although tinnitus may not be of any considerable volume, it may finally bring the patient to the verge of insanity. In a psychic case a little mental discipline is what the patient needs. If you cannot discover the cause of tinnitus or are unable to remove it, it is very likely of nervous origin. If the patient is constantly thinking of it, he will hear nothing but tinnitus, both day and night.

Laryngitis Hypoglottica Acuta.

Paper by Dr. C. W. Richardson, Washington. See page 106.

DISCUSSION.

Dr. T. P. Berens, New York:—The series of the cases that I have seen similar to the condition described by Dr. Richardson have been different only in that they all were older. I have seen several cases under six years of age, but most of my cases have been from eight to twelve, and adults.

Dr. Richardson has given a beautiful clinical picture. I think he left an important factor out, namely: rheumatism, in the etiology. I saw a case in a child nine years of age, with a distinct family history of rheumatism, at the time with rheumatism of the knee joint. She had swelling of the false cords and slight injection of the true cords, with marked swelling of the arytenoid region and inter-arytenoid space. This case cleared up rapidly under the local treatment of adrenalin and the internal administration of large doses of salicylate of sodium. A few weeks later the child had rheumatism in the knee on the opposite side, and also laryngeal involement. It has been more than one and one-half years since the last attack. It cleared up entirely under the salicylate of soda. I have seen several similar cases of undoubted rheumatic origin in adults and children simulating laryngismus stridulus and in those children in which an examination could be made I could find the cords scarcely altered, usually however finding the false cords swollen and swelling about the arytenoids and aryteno-epiglottidian folds. Unless the child permits a laryngeal examination to be made it is difficult to distinguish between this condition and diphtheria and the ordinary spasmodic croup in children until the disease has progressed sufficiently to permit of a diagnosis by other than local symptoms. When we get adults it is difficult to diagnose between this condition and specific laryngitis in its very early stages. A few days however will always suffice to clear up the diagnosis.

I would like to thank Dr. Richardson for calling our attention to this subject again, and I am glad to have had an opportunity or presenting this case of genuine rheumatism of the larynx in connection with the rheumatism in the joints. Local treatment gives comfort to the patient, while it gives time for the general treatment to take effect.

Dr. J. A. Stucky, Lexington:—I would like to ask Dr. Richardson with respect to the strength of the solution of silver nitrate. (Reply, 1 per cent. solution). I have used this remedy and had very ugly results. The reaction following the irritation caused almost complete stenosis.

I am very glad to emphasize the point made by Dr. Berens as to rheumatism being the cause. I have seen many cases in which rheumatism could be traced as the cause. In the transactions of the International Congress held at Washington, is a case which I reported there. The patient died before I could get to the house from my office with the tracheotomy tube. I have seen many of the cases relieved by the treatment which relieves acute rheumatic disturbance, namely: very free purgation, active diaphoresis, and large and frequent doses of salicylates.

Dr. Richardson:—I think Dr. Berens' case was a pure case of rheumatic laryngitis.

Nasal Aprosexia.

Paper by Dr. G. Hudson Makuen of Philadelphia.

DISCUSSION.

Dr. H. W. Loeb, St. Louis:—Mr. Chairman, the case presented by the essayist is a very interesting one, and the explanation by the essayist as to why the cure is not complete is very well founded. I think we can all accept the influence of the aprosexia and the trouble in the antrum as the cause of the lack of further improvement in this case. I think the result is very good, as the case was a bad one.

I think Dr. Makuen has been laboring to get our colleagues interested in speech defects, but I do not think he has been as successful as he deserves to be. I think it is a subject n which every laryngologist should be intensely interested. Many cases could be relieved by a little attention and practice in the proper direction. Many children are kept from proper schooling on account of defects of speech. It is quite as important as the relief for instance of the minor affections of the nose and throat.

Dr. Means:—I was very much interested in Dr. Makuen's paper because it comes so near home. I was a stammerer from the sixth to the ninth year of my life. They told me it came from a scare. I was asleep on the cellar door when a thunder storm came up which frightened me so badly that as a result I was a stammerer for three or four years. I have a boy at my home who is a stammerer and who changes the form of stammering as often as he changes his residence. Sometimes he will stall on the consonants; this lasts for three or four weeks, and then some other form come along. If he stays at home and we are careful not to get him excited, he has no trouble. The teacher has no trouble in school; says he is as bright as the other children, but occasionally takes a spell which lasts for a week. It is the change of type of stammering which is most unique in his case. If he goes to a party he will probably have some new type when he comes home. I am not well enough posted in the process to educate the child to stop stammering.

Dr. J. A. Stucky, Lexington:—I would like to ask a question of Dr. Makuen. He mentioned hypnotism, and I would like to know if it was hypnotic sleep or hypnotic suggestion.

Dr. G. Hudson-Makuen, Philadelphia:—It is important that the treatment of stammering should be kept within the medical profession, instead of being relegated to schools in which the condition is not well understood, and the patients are required to pay large sums for no value received. No one should be so capable of dealing with this affection a the laryngologist, for he knows something of the organs in which the difficulty exists. He may not know the mental peculiarities of the stammerer but these can be easily understood with a little study and practice. No two persons stammer in just the same way, but each one presents a type which is peculiar to himself and from which he may depart slightly from time to time.

I have used the milder forms of hypnotism in a few cases, but only for the purpose of putting the patient in a condition to receive the training. This boy when hypnotized will give his whole attention to the work, and he can not be induced to do this in his normal state. Of course hypnotism of itself will not cure stammering, but in a very limited number of cases I have found it of value in helping to control the mental processes of stammerers. The result of its employment was little short of marvelous in one of my recent cases.

Replying to Dr. Phillips question would say that only about 5 per cent. of my cases have been girls. Some one has said that stammerers think faster than they talk, and that therefore girls do not stammer. Joking aside, however, it is well known that girls naturally have greater fluency of speech than boys, and this helps to explain the fact that they less frequently stammer.

Laryngeal Stenosis from Post-Typhoid Perichondritis, Tracheotomy, Thyrotomy, Intubation. Exhibiton of two Patients.

By Dr. Chevalier Jackson and Ewing W. Day, of Pittsburgh, Pa. See page 24.

DISCUSSION.

Dr. C. W. Richardson, Washington:—Mr. President, I was much interested in the cases reported. It is a thoroughly interesting subject. Perichondritis is one of the unusual complications of typhoid fever. Perichondrial involvement usually seems to be the most severe type, and the few cases which I have seen were the same intense form as described by Drs. Day and Jackson.

I have nothing to suggest in the matter of treatment. The treatment they carried out seems to be the only one which can be instituted. One case which I had, died after I had gotten it to where a good sized intubation tube could be introduced. The tube was coughed out one day and there was almost immediate stenosis, and before the patient could be tracheotomized he died.

The second case after wearing the tube six months in perfect comfort, went home and I have not heard from him since. The treatment was practically the same as in those of Drs. Day and Jackson except I introduced the intubation tube almost as soon as the wound healed. I did not have the tracheotomy tube which they are using and which I consider a decided advancement.

The resulting improvement must be greater with this method than the early introduction of the intubation tube. I cannot see that the ultimate result is one promising great comfort to the patient. I doubt very much if we can ever get them into such a condition so that we can displace the intubation tube entirely. Very few ever get over the dread of losing the tube. The case, of which I spoke, which died, constantly feared the accident happening which finally ended his life.

Dr. E. W. Day, Pittsburgh:—I believe as laryngologists we are inclined to shun opening the larynx. We will open it oftener in the next ten years that we have done in the past. We have grooped too much in the dark in the case of tumors and other abnormalities, and I believe the sooner we abandon this mode of operative proceedure and open the larynx and work in a clear open field under direct inspection the better it will be for our patients. Thyrotomy is not a difficult operation and not one which is usually very risky. The great point in these cases of stenosis is the after treatment. If you have not time to stay by the case and put in faithfully several hours a week for several montas, then do not do it at all, for it will be a failure. There is much more in the after treatment than in the surgical.

Dr. Chevalier Jackson, Pittsburg:—In closing he said that the accident spoken of by Dr. Richardson was the very thing that the T shaped tube was devised to prevent. It held the laryngeal lumen widely open till healing had taken place, till cicatrical contraction was completed, till a permanent lumen lined wiih epithelium had resulted. While this was going on, the patient was perfectly safe because of the maintenance of the opening in the neck till the result just mentioned had been obtained, when the intubation tube was inserted to allow the tracheotomy wound to close—only about a half of a square inch in area on the inner tracheal surface. At this time there will be no danger if the intubation tube be coughed out, because the inflammation has subsided, and there is no edema or swelling. Whatever might be anticipated ultimately, there is no dyspnea in either of these cases upon removal of the tube, as many instrumental removals in both these cases had demonstrated. As mentioned in the paper case, one had the tube out for a whole month. It would be very different if the intubation tube were inserted immediately after the thyrotomy For a month at least the unhealed mucus membrane with its attendant inflammatory phenomena would be apt to cause an immediate dyspnea from stenosis, should the tube be coughed out.

Report of a Case of Labyrinthine Disease.

By Dr. John K. Sterritt, of Pittsburgh, Pa.

Dr. Ward, Pittsburg:—Mr. Chairman, I have not anything to say on this report. A few minutes ago the Dr. mentioned to me the name of the patient who presented such unusual symptoms and I recalled at once that this was the first patient whom I ever intubated. He was then but a small child two or three years of age, and I think suffering from the disease which Dr. Richardson described a few minutes ago. He made a rapid recovery after intubation.

I was always under the impression that any disturbance of the internal ear was attended with more marked symptoms than was experienced in this case. I think it is rather remarkable on account of the absence of any pronounced symptoms.

Dr. W. C. Phillips, New York:—I would like to add a word because I have seen and operated on many cases and frequently found some portion of the internal ear involved. I do not recall that it is at all unusual to find such involvement in patients who have not shown vertigo and other symptoms often associated with such involvement. I remember one case in which the whole internal ear was affected without any marked symptoms.

Dr. Rae, New York:—This very interesting case seems to me to admit of an explanation. We have here a history of prolonged suppuration, attended with caries, and finally with the separation of a large sequestrum including one of the semicircular canals. Now, had the gross disarrangement in the labyrinth, caused by occlusion of one canal, been coincident in point of time with the separation of the sequestrum, it is evident that most pronounced symptoms would have resulted. But such has not been the case, and it is only fair to conclude that the occlusion of the semicircular canal had long preceded the separation of the sequestrum; and further, that the process by which the occlusion was affected, was a very gradual one, admitted of a complete maintenance of equilibrium in the labyrinth throughout.

From such a case we are justified in concluding that a sudden disturbance of intra-labyrinthine pressure, although the exciting cause may itself be comparatively trifling, will be attended with most distressing symptoms, while such a grave, gradual change as that described by Dr. Sterritt may be noted for its entire lack of symptoms.

Dr. T. P. Berens, New York:—I have seen several of these cases in which there has been a disturbance. Dr. Rae's reason, I think, is a very good one, but I think we must go further and remember that when the semicircular canal is removed we get no vertigo. If it is only injured we get marked vertigo.

In Dr. Sterritt's case it seems it was practically complete acclusion of the semicircular canal.

Dr. W. S. Bryant, New York:—I think Dr. Rae is right because this has been a chronic condition. I think it is not uncommon to have considerable necrosis with exfoliation of the bone without destruction of the adjacent part. We can lose the cochlea and still have the semicircular canals, and vice versa.

Dr. J. K. Sterritt:—I did not mean the case to be anything unusal, but lasting that length of time it seems to me there should have been some tinnitus, where there was no tinnitus and no vertigo. Also that the case should be a lesson both in diagnosis and prognosis, as well as in preventing errors of treatment.

ABSTRACTS FROM CURRENT OTOLOGIC, RHINOLOGIC AND LARYNGOLOGIC LITERATURE.

I.— EAR.

A Case of Mastoiditis; Sinus Thrombosis; Pyemia; Two Operations; Recovery.

THOMAS R. POOLEY, New York, N. Y. (*Medical News*, January 16, 1904.) The patient was a stout girl of 25 who had been in attendance five weeks before on her sister who died of puerperal septicemia. Following an attack of grippe there was earache on the left side, followed by rupture of the drum and free discharge, with marked pain, tenderness and swelling confined to the mastoid region. The discharge showed abundant evidence of the presence of streptococci. The appearance of the patient was that of profound infection; temp. 101.6; pulse 120; respirations 30. Immediate operation done. Outer table softened, necrotic. Cells filled with dark blood and granulations. Cortex removed to the tip. On attempting to enter the antrum with the rongeur, the sinus, position of which was abnormally far forward, and its wall extremely thin from caries, was accidentally opened, giving rise to profuse hemorrhage which was quickly arrested. A discolored point was seen upon the sigmoid roof. All dead bone and granulations removed. The following day her temperature dropped to normal, pain ceased, condition good. Two days later wound looked aseptic. Temp. 100, pulse 86, respiration 28.

Two days later, March 12, temp. 100.4, wound sloughy, periosteum detached from the bone, profuse, offensive discharge from the wound. Sinus cleansed, gauze re-inserted.

Distinct redness and tenderness in the course of the jugular vein, and acute tonsillitis next supervened. This was followed on the 15th by general aching and a painful arthritis of the middle finger of the right hand. There was suppuration and a gangrenous appearance of the posterior flap of the wound. Temp. 103.

March 16, severe chill, temp. 103 6; pulse 130; respiration 36, choked discs in each eye. Diagnosis of a septic thrombosis made.

March 17, original wound opened, all the remaining bone covering the sinus removed, and the covering then slit with straight scissors in its long axis. It was found to be filled with a firm fibrinous clot, which was removed with a sharp spoon and the blood current re-established in this direction, this part of the sinus then being plugged with iodoform gauze. The exploration was then continued in the descending portion of the sinus toward the jugular bulb, which was also found to be filled with a purulent, disorganized clot. On removal of this no blood current could be re-established, so the curette was carried into the jugular, removing clots and pus.

Ligation of the jugular seemed to be imperatively demanded, but the patient's condition was too poor. The pulse was rapid (140 or more) and very feeble; the respirations were very frequent. More or less forcible manipulations were now made on the jugular vein and neck, by which means quite a quantity of blood, streaked with pus, escaped, followed by free and copious hemorrhage. This method was resorted to with the full knowledge that it has been strongly condemned, because of the author's unwillingness to leave any obstruction, and the assurance that the patient who was almost moribund, could not longer survive any operation. The operation was then hastily terminated. No sutures were employed. The exposed dura was covered with iodoform gauze, both ends of the sinus plugged with the same, and bandage applied. Hypodermics of ether, whiskey and strychnine in considerable quantities were required for the next twenty-four hours, during which the temperature ranged from 103 to 103.6.

On March 19 the wound was dressed; very little pus. There was pain in the right ankle.

On March 20 the ankle was painful, red and swollen. The wound discharged profusely.

On the 24th the temperature went to 104.6; pulse 131;

respiration 52. Physical examination revealed a pneumonia of the right lung. Recovery took place from the pneumonia. An abscess formed in the upper part of the right arm and later over the left buttock, followed again by two abscesses.

On May 29, a large sequestrum of bone, 3 cm. long, by 1 1/2 cm. by 8 mm. was removed. This consisted of a portion of the mastoid and squamous portion of the temporal bone. Healing progressed more rapidly after this, and on June 11, nearly four months after admission, patient was diecharged with a small area of wound unhealed, but the sinus and antrum wounds entireiy healed.

This case is remarkable on account of the severity of the symptoms and the co-existence of a pneumonia with an extreme degree of pyemia, followed by recovery. The author thinks that it is most probable that the sinus was infected at the time of the first operation, as for three days thereafter improvement took place. Then the sinus clot formed with the subsequent appearance of the symptoms so characteristic of sinus thrombosis. *Richards.*

The Great Value of Drainage and Ice in the Early Stages of Mastoiditis.

SARGENT F. SNOW, Syracuse, N. Y. (*Jour. Amer. Med. Asso.*, January 2, 1904.) The author begins his treatment by what he calls a tympano-Wilde's or tympano-canal operation, cutting the drum in the posterior half from the lower border upward to and through the attic folds, outward along the superior posterior wall of the external auditory canal. In most cases momentary anesthesia is necessary. This is followed by hot irrigations in the external canal, using a quart of water heated up to 115 degress every 20 minutes. As soon as relief is obtained, constant cold by means of a Sprague ice-bag is applied to the mastoid and kept in immediate contact therewith for hours, without marked intervals in the renewing, as the ice application to be effective should be constant, continuous and prolonged. He has kept the ice bag on as long as six days, and this with the constant, continual application of the ice, does much to reduce morbid activity and hasten recovery. The fact that we have a tender mastoid, projecting auricle, prolapsed superior wall, high temperature and previous discharge need not tell us to proceed immediately with the external operation, but does tell us that we must at once improve the drainage and combat the inflammatory action. *Richards.*

Some Recent Experiences with Chronic Suppuration of the Ear.

Philip Hammond, Boston. (*Jour. Amer. Med. Asso.*, January 2, 1904.) A chronic discharge from the ear is always a potential menace to life. Three cases are cited illustrating this: In one a prompt and satisfactory recovery took place after the operation of removal of the ossicles. In two others an acute attack took place and death resulted, in one from septic meningitis and the other from necrosis of the brain.

When caries is limited to the ossicles, ossiculectomy can be performed with a fair prospect of cure, but when let to extend farther the so called radical operation with thorough exploration of all possible fistula avenues should be performed. The question of the influence on the hearing should not be allowed to decide as to the operation. *Richards.*

The Efficacy of the Treatment of Acute Purulent Otitis by Aseptic Drainage.

H. Gradle, Chicago. (*Jour. Amer. Med. Asso.*, January 2, 1904.) Free incision of the drum membrane is performed as soon as the diagnosis is made and continuous absorption of the discharge maintained by an aseptic gauze drain in the meatus and a large dressing over the auricle, both meatus and auricle having been previously sterilized with carbolic acid solution and powdared with boric acid. The external gauze pad is changed as soon as moisture appears, while the tampon in the meatus is left from 24 to 48 hours. If this method is carried out thoroughly the discharge in most cases can be kept serous. *Richards.*

On a New Symptom of Hemoglobinuria, Cyanosis and Gangrene of the External Ear.

Rohrer, Zurich. (*Archives of Otology*, Vol. XXXII., No. 6.) A well-nourished man, aged 32, with a history of acute rheumatism and gonorrhea, after severe exertion and exposure to cold, showed bluish discoloration of both auricles most marked at the helix margin in the neighbood of the Darwinian tubercle.

The urine contains albumen and blood pigments.

On the left auricle superficial gangrene developed, but by tonic treatment, rest and diet, all symptoms had disappeared at the end of four months. *Campbell.*

On the Pathology and Treatment of Chronic Purulent Otitis.

SUCKSTORF, Rostock. (*Archives of Otology*, Vol. XXXII., No. 6.

I. Indications for the removal of the hammer and anvil.

Kessel gave the following:

1. Intractable stenosis of the tube.
2. Total calcification of the Mt.
3. Caries of the ossicles.
4. Anchylosis of the stapes associated with disturbing tinnitus.
5. Cholesteatoma of the tympanum and of the mastoid process unimproved by usual method of treatment.

The first two indications are so rare that they may be disregarded. The fourth has been abandoned on account of questionable results obtained, and in the case of the fifth the radical mastoid operation is performed. Ossiculectomy is also indicated in caries of the attic with or without caries of the malleus and incus, and likewise in cases of mucopurulent attic inflammat on which does not respond to palliative treatment. This operation obliterates the complicated pockets formed by the ligaments and folds of mucous membrane passing to the ossicles.

II. Relative frequency and localization of disease of the ossicles.

In a series of 106 radical operations:

The malleus was found diseased in 36 per cent. and absent in 48 per cent. of cases.

The incus diseased in 24 per cent. and absent in 69 per cent.

The malleus was usually affected in the region of the head, and the manubrium and the incus the region of the long process. *Campbell.*

Manifestation of Traumatic Hysteria in the Organ of Hearing.

Barth, Sansburg. (*Archives of Otology*, Vol. XXXII., No. 6.) Two cases are reported—the first a girl, aged 11, who was frightened by a dog leaping at her in the dark. Bilateral deafness, without treatment, disappeared in eight days.

A week later she had another fright and complete bilateral deafness with unconscious perception of musical sounds persisted for two weeks, when hearing returned to normal.

The second case, a healthy farmer, aged 21, who, a few hours after diving, claimed that a little blood oozed from the left ear. Next day there was difficulty in hearing on that side, and two days later bilateral deafness with no apparent sign of trauma or of an inflammatory process. A complete sensitive, sensorial hemianesthesia developed on the left side of the body with hyperesthesia over the mastoid process.

Unconscious power of hearing musical tones was retained. The visual field was greatly contracted. The condition having persisted for months renders the prognosis unfavorable.

A history of insanity appears on his maternal side.

Campbell.

On the Causation and Prevention of Bone Necrosis in the Course of Chronic Purulent Otitis.

Scheibe, Munich. (*Archives of Otology*, Vol. XXXII., No. 6.) The author excludes tuberculous middle ear suppurations because necrosis is a constant condition and its cause is well known.

The aditus and antrum were generally both affected:

The antrum 13 times.

The aditus 12 times.

The tympanum 4 times.

The tube 1 time.

Of 17 cases, cholesteatoma of the upper middle ear cavities was present in 16.

There was fetid pus in 16 of the 17 cases; from this it would seems that cholesteatoma only produces necrosis when pus is fetid.

In all 17 cases, a retention of pus could be demonstrated, either by the masses of cholesteatomata or by polypi and granulations.

The prevention of putrefaction of pus can in most cases be accomplished by antiseptic irrigations with the tympanic canula. Where fetor persists operation is indicated.

The author's observations lead him to state that in chronic purulent otitis, with the exception of the tuberculous and the syphilitic, the appearance of necrosis can be prevented with certainty by proper treatment. *Campbell.*

On Primary Epithelioma of the Temporal Bone.

STURM, Rostock. (*Archives of Otology*, Vol. XXXIII., No. 1.) A man aged 42 with negative family history had a suppurating right ear since childhood. Eight months prior to coming under observation severe vertigo with noises in that ear continued for several days. Since then there have been intermittent pain and more recently a drawing in the right half of the head with some parietal tenderness.

On inspection a fistula is discovered in the upper and posterior wall which admits a probe to the depth of 1 cm. No perception of hearing on the diseased side, no facial paralysisl, no glandular swelling.

Operation was undertaken under the supposition that the case was one of chronic mastoiditis, but instead a long cavity was found filled with tough, lobulated, yellowish-red masses which on examination proved to be squamous epitheliomata. The dura of the middle cranial fossa and the facial nerve were exposed. Further operative measures were refused and the disease was steadily progressive. He succumbed six months later. On autopsy, on the anterior surface of the right petrous bone a tumor larger than a cherry and to its inner side two smaller tumors, all connected and covered by the dura, were found. Thick pus escaped from the right internal auditory meatus. Near the right margin of the occipital foramen the dura is yellowish and elevated by tumor masses. The entire petrous bone was practically replaced by carcinoma. The transverse sinus was invaded and the carotid artery surrounded by the new growth.

The development of primary epithelioma in the middle ear cavities is brought about by the growth of epidermis extending inward through marginal Mt. perforations.

Campbell.

On the Pathology of Deaf-Mutism. Report of a case of Acquired Deaf-mutism with Obliteration of Tympanum, Aditus and Antrum.

HOLZEL, Munich. (*Archives of Otology*, Vol. XXXIII, No. 1.) The changes in the temporal bone examined must be considered as the residue of a panotitis. In addition there was absence of the Mt., cholesteatoma; the tube, tympanum, aditus and antrum were obliterated, sclerosis of bone, bony occlusion of both windows; hyperostosis of bone on the inner and outer walls of the promontory and changes in the labyrinth.

The specimen had remained so long in alcohol, that nerve staining gave no results.

In this case the purulent middle-ear trouble must have been especially virulent, such as we find in infectious diseases and above all in scarlet fever. Moreover it must have taken place in early childhood, before the 7th year, since loss of speech followed. *Campbell.*

Tuberculosis of the Ear Ending in Recovery.

HEGETSCHWEILER, Zurich. (*Archives of Otology*, Vol. XXXIII, No 1.) Four cases are reported where otitis media and pulmonary tuberculosis were coexistent. In one case only, did the otitis follow the classical course of tubercular infection.

In two of the other cases a greyish-white membrane was found, without the mastoid tip in one and on the promontory in the other. This membrane, Schmauss and Albrecht consider an initial stage of the caseation of tubercle and call it fibrinoid.

As regards treatment, any improvement in the patient's general condition is followed by a local improvement in the ear.

Convalescence is aided by antiseptic treatment in the tympanum; the insufflation of fine iodoform powder, after cleansing and drying, produces the best results.

Surgical intervention must be employed when scar tissue is to replace polypoid hypertrophy of the mucous membrane and caries of bone. *Campbell.*

Tubercle-like Bacilli in the Discharge of Chronic Purulent Otitis.

DeSimoni, Milan. (*Archives of Otology*, Vol. XXXIII, No. 1.) These bacilli occur very frequently in milk and in commercial butter. They are found in infusions of several field herbs and in the feces of milk cows, hence their presence in milk.

They have been found in the most varied secretions from the oro-nasal cavity. They should not be confounded with the smegma bacillus, which cannot be cultivated on artificial media.

The cases reported where the bacilli were found in the discharge of chronic purulent otitis were those of a girl aged 9 and a man aged 26, both of good heritage.

The bacilli which grow in any media were longer and more slender than the common tubercle bacillus. They stain with the ordinary aniline dyes and are not discolorized by gram. Inoculation of guinea-pigs and rabbits produced no lesions. *Campbell.*

Osteomyelitis of the Temporal and Adjacent Bones of the Skull as a Sequel of Otitis Media Suppurativa.

Richardson, Washington (*Archives of Otology* Vol. XXXIII., No. T.) The author reports two cases, the first of which he has previously reported in 1900. Case II that of a girl aged 14 who developed a mastoid abscess within 5 days of a Mt. rupture during an influenza otitis media. Tenderness and infiltration extended over the squamosa and posterior to the mastoid. She appeared very ill. Temp. never below 102° F. with an evening rise to 103° and 104° F. The antrum was opened and tip removed after which there was a temporary fall in temperature but it quickly rose again to 194° F. and higher; a septic pneumonia developed. On closely examining the operative wound pin-points of pus were seen disseminated over the bony wall. The wound was enlarged superiorly and posteriorly into the parietal and occipital bones before all diseased bone was removed. A'though the lateral sinus appeared normal it was opened as a precautionary measure The convalescence was delayed by two intercurrent attacks of erysipelas. *Campbell.*

Contribution to the Study of the Endocranial Complictions of Otitis Media.

LACARRE, England. (*La Presse Oto-Laryngologique Belge*, Vol.. II.) Author describes a case of thrombosis of the lateral sinus following otitis media acuta complicated by caries of the petrous, and comes to the conclusion that in many cases operation comes too late and when there is caries of the petrous and the temperature shows great intermissions, a thrombo-phebitis generally is to be found.

When there is no fever at the time of the operation the author does not think it necessary to make the sub-ligation of the internal jugular Mt. as proved in this case, in which the result was favorable. *Meyjes.*

Clinical Phenomena of Bony Complication in Chronic Purulent Otitis Media.

PROF. SCHIFFERS, Liege. (*La Presse Oto-laryng, Belge.*, Vol. II., No. 7.) Three cases of the ordinary complications in otitis media, cured upon operation. *Meyjes.*

Paracentesis of the Drum.

GUYE. (*Nederlandesch Tydschriftvoor Geneeskunde.*) Deel II, No. 5, 1903. Guye also stays on the side of those who think paracentesis in cases of acute otitis media not only allowable but necessary when there is swelling of the drum, pain in or round the ear, fever, etc., and where no spontaneous perforation occurs within a very few days. He attributes the bad results of the use of the Politzer bag in cases of otitis media acuta, not to the dangerous high pressure with which the air is forced into the tympanum, (abstractor believes it does) but to the bag itself, when the insufflated air is not sterilized by cotton saturated with menthol. *Meyjes.*

Boric Acid Wound Dressing Without Packing After the Radical Mastoid Operation.

PROF. EMAN, Ghent. (*La Presse Oto-laryng Belge.* Vol. XII, No. 8.) In seven cases E. used for after treatment in radical operations only insufflation with boric acid without any packing. He is quite satisfied with the results. (Abstractor also satisfied with boric acid and aristol).

Meyjes.

A Case of Acute Labyrinthine Speech-Deafness.

M. GRONLEND. (*Hospitalstidene* No. 41, 1902.) The following interesting history is given:—A 15 year old ship's-boy, while his ship was in the tropics, suddenly was attacked by deafness, on account of which he was sent home; 5 months later he came under observation. The objective examination showed that the youth was normally developed, his intellect dulled, his speech uncertain and hesitating. He was careful not to use long sentences, and preferred to express himself as little as possible. There were signs of a mild otitis media catarrhalis. The examination of his hearing showed that he was absolutely unable to understand a remark or a conversation, but was able to destinguish the pitch of different tuning forks, selected at random, and he heard whenever any one whistled behind his back. The test by the Bezold-Edelmann tuning forks of his perceptions of notes showed a partial deafness on both sides, right from a to g, left from d to d'' and from "g to a;" on both sides, he could not hear the lowest 4 notes of the scale. These findings are absolutely constant.

The partial deafness borders on the very part of the scale which, according to Bezold, is necessary for understanding speech. In this case, it is probable that an acute febrile disease, with which he suffered just before the appearance of his deafness, probably a mild cerebrospinal meningitis, was the cause of his disease.

In the course of 1 1/4 years his trouble became better, so that the patient, without seeing the mouth of the speaker, could understand short sentences. His musical understanding continued bad. *Joh. Fred Fisher.*

A Case of Thrombophlebitis of the Cavernous Sinus, Complicating an Empyema of the Sphenoidal Sinuses and Ethmoidal Cells, Mistaken for a Thrombophlebitis of the Lateral Sinus.

FINLEY, Havana. (*Archives of Otology*, Vol. XXXII., No. 6.) A seaman, aged 16, had left otitis media suppurativa for several weeks. Two days before coming under the author's care, the temperature rose to 104° F, pain in the ear became intense and a paracentesis was done.

Delirium supervened, the skin was cold and clammy, pulse 120, small and intermittent. Fundi normal; paralysis of the left external rectus.

On anesthetizing the patient, there was noticed a leechlike swelling parallel and a little above the left superior orbital margin indicating some obstruction to the flow of blood through the ophthalmic vein; and this together with the ext. rectus paralysis, showed the cavernous sinus to be involved.

The antrum and middle ear were exposed, the lateral sinus bared but on aspiration found healthy. The temporal fossa was opened and brain puncture in several directions proved negative.

Operation was unsatisfactory and unavailing. On autopsy no sign of pus or bone disease found in the neighborhood of the temporal bone. The pia at the base was the seat of a dense plastic exudation.

The cavernous and circular sinuses were occupied by a purulent clot, which extended into the left ophthalmic vein. The sphenoidal and posterior ethmoidal cells were occupied by thick yellow, fetid pus. The patient had never complained of or showed evidence of nose trouble. *Campbell.*

II.—NOSE AND NASO-PHARYNX.

Some Remarks on Chronic Sphenoidal Sinusitis.

ALBERT E. ROGERS, Boston. (*Boston Medical and Surgical Journal*, December 31, 1903.) The author finds that sphenoidal diseases is much more frequent than has usually been thought to be the case. In 600 patients at the

Massachusetts General Hospital he found 29 to be cases of accessory sinus disease or nearly 5 per cent. Of these 29 cases the maxillary antrum was affected four times; the frontal sinus once frontal; and ethmoid together twice; anterior ethmoid three times; posterior ethmoid two times; the sphenoidal sinus 16 times and a mixed posterior ethmoid and sphenoid once. This makes epyema of the sphenoid by far the most frequent and does not agree with the majority of clinical observations which have always placed the maxillary sinus as the most commonly affected. He did not find in the clinical records a single case of chronic sphenoidal sinusitis in the previous five years.

The probe should be the main reliance in the diagnosis. He thinks the sphenoidal the easiest of all the sinuses to enter and the one most commonly diseased. The probe must be passed in a direct continuation of the line from the inferior nasal spine to the middle part of the middle turbinate and must not go anterior to this line. The distance is $7^1/_2$ cm. from the inferior nasal spine to the anterior sphenoidal wall, and never more. Should the probe go a greater distance one is either in the sphenoidal sinus, brain cavity or the nasopharynx. If the probe goes over the turbinate in the middle part in the direct line mentioned, it is certainly in the sphenoidal cavity. The author has verified this measurement on more than 100 specimens. The probe must be bent with a slight horizontal concavity in order to pass around the convexity of the middle turbinate, and the tip also bent slightly downward as it is easier to enter the cavity and there is less danger of injuring the posterior wall. On entering the cavity and feeling roughened bone or spongy granulation tissue one is warranted is making a diagnosis of sphenoidal disease and justified in opening the cavity. Many obscure symptoms have their seat in sphenoidal trouble such as somnolency; numbness of the upper lip and general nervousness; pain in the head; pain in the back of the head; deep-seated pain over the eyes; post-nasal discharge.

He enters the cavity by cutting away the anterior wall with a Knight's cutting forceps and Grünwald's downward-cutting forceps so as to bite out the anterior wall and establish free drainage. So much of the middle turbinate is removed as may be necessary.

Reports of eleven cases in which the sphenoid was operated upon, and in all of which complete relief followed, are given. Severe headaches and dizziness were the most preminent symptoms complained of in the cases reported.

Richards.

The Window Resection Operation for Correction of Deflections of the Nasal Septum.

OTTO T. FREER, Chicago, Ill. (*The Jour. of the American Med. Asso.*, December 5, 1903.)

Resection of the Nasal Septum With Report of Fifteen Cases.

LEON E. WHITE, Boston. (*Boston Med. and Surg. Jour.*, April 21, 1904.) Dr. Freer's method has already been reported on and reviewed in this journal. The present paper records his later experience and brings the number of cases up to 60, all of whom have resulted favorably, and there have been only nine perforations and of these six were in his first fifteen patients. The cases cover all the varieties of deflected septum, not only of the cartilaginous but of the bony as well. A number of special instruments have been devised and illustrated. These make the operation much easier. Powdered cocain is used for local anesthesia.

The essential principle of the operation is the making of a vertical incision at the most prominent part of the deflection to very nearly the floor of the nose, and then a horizontal cut at right angles to this so as to form an inverted T. The mucus membrane is then carefully dissected off, the underlying cartilage removed, the mucous membrane replaced and held there with cotton tampons for a few days until it becomes attached. He has never had sloughing of the flaps.

Dr. Freer's paper should be studied in its entirety. His method was developed without any knowledge of the original workers in this field, namely: Krieg and Boenninghaus, so that his instrumentarium and technic are entirely original so far as he is concerned.

In a recent discussion before the Laryngological society of London, Sir Felix Semon in reporting on this new operation and its various modifications, gives full credit to Krieg, Boenninghaus, Krabe, Hajek and Menzel, but omits all reference whatever to Dr. Freer, whose paper very much antidates any publication in regard to the operation by Hajek.

Dr. White's article takes up the same subject, reporting good results in 15 cases with rapid recovery, lack of pain, short after treatment, freedom from sepsia and free from respiration 48 hours after the operation.

While giving full credit to Freer for the work which he has done in connection with this operation, he states that his own methods differ somewhat in that he has simplified and reduced the number of instruments necessary; makes only one incision as a rule, but occasionally if marked thickening or the deflection is extensive or far back, it is necessary to make a second incision parallel to the floor of the nose. He also sutures the flap, having devised a special needle-holder and needle for this purpose. He thinks that sutures are an advantage since they keep the edges of the wound in coaptation and frequently allow primary union to be obtained over a good deal of the area, preventing a tendency of the flaps to curl up. He packs the operated side with a number of loose cotton pledgets made from corrosive sublimate cotton, previously powdering the cut surface with Aristol. These remain from 24 to 48 hours. He does not pack the concave side. He cautions against using cocain and adrenalin on the concave side as he thinks where these agents are used on both sides that there is more danger of sloughing.

He has devised two knives for making the cut through the cartilage with the cutting surface relatively to the shank so short that there is very little danger of cutting through into the opposite side,

Inhis first six cases there were two perforations, while in the last nine, but one. As the edges of the perforation are covered with mucous membrane, they cause no annoyance to the patient afterward, although it is preferable to avoid them. In none of the cases was there any damage to the nasal profile, while in two of them where there was decided twist in the nasal tip, the deformity was greatly lessened, thus proving that the septum is not a support for the nose but only a division between the nares.

The operation as performed by him requires about 1 1 4 hours on the average, the first half of which is done in the upright position. When ready to remove the cartilage the patient is placed reclining on a high operating table with the head resting on an adjustable section so that it can be raised or lowered as it becomes desirabie to illuminate any particular part of the septum. Dr. Freer does his operation in the erect posture but with every preparation to operate with the patient lying down should he feel faint while sitting. Both papers are well worth careful study as a full explanation of the operative details are given. *Richards.*

Clinical Experiences With the Enlarged Pharyngeal Tonsil.

GRADLE, Chicago. (*Archives of Otology*, Vol. XXXII, No. 6.) The author has seen the characteristic facial expression, or adenoid habitus, in children with suppurative rhinitis with narrow nasal passages and a normal or at most a very slightly enlarged pharyngeal tonsil.

Two cases were observed where asthma was apparently cured by removal of the growth.

Cough, reflex or due to a subacute bronchitis, frequently ceases immediately after an adenoid operation.

A large proportion of children with phlyctenular keratitis have adenoid, and removal of the latter is often of unmistakable influence upon the course eye disease.

In carefully kept histories of cases of inflammation of the Eustachian tube it will be found that they are preceded by inflammatory conditions of the pharyngeal tonsil; and as adenoids are subject to frequent spells of inflammation, it is the extension of the inflammation which proves a menace to the ear. The author considers the adenoid enlargement the consequence of replected attacks of coryza during the first few years of life.

For removal of the growth the author has modified the Schnutz adenotome. *Campbell.*

Tertiary Nasal Syphilis.

POSTHUMAS MEYJES. (*Tydschr-voor Geneskn*, Vol. I., No. 26.) From eight cases of nasal syphilis the author concludes that tertian syphilis is not so very seldom, showing itself first either in the nose or in the naso-pharynx. What appeared to be an ordinary cold in the head proved four times the earliest manifestations of the trouble. In addition to the nasal obstruction there was supra-orbital neuralgia, unilateral mattery secretions. loss of olfaction and general mental depression. Temperature generally a little higher in the evening. There is in this stage little to be found in the nose—slight hypertrophy of the inferior turbinate bone; mucus; later an ulcerative process on the septum where the probe often strikes denuded bone. The secretion is purulent and bloody. In this stage differential diagnosis must be made from tuberculosis, lupus, malignant neoplasms, diphtheria and leprosy. The difficulty of diagnosis lies in the first stage when patients are really quite ignorant of any previous infection. In the author's cases the syphilis was manifested in the left side of the nose, and he, too, confirmed the opinion of others that an ulcer in the narophagus may be for a long time the only symptom of tertiary syphilis. *Meyjes.*

A Case of Congenital Atresia of the Choanae.

PROF. D. E. SCHMIEGELOW. (From the Oto-laryngologic Department of the St. Joseph Hospital.) *Sophus Beutzen Ugeskrift for Loeger*, No.20, 1903.) The case is one of a 30-year-old woman who had suffered from nasal trouble since birth; no air passage through the nose; power of smell = 0. The intellectuality slightly developed.

It was seen by rhinoscopy that the choanae were naturally formed, but just before frontal plane lie a whitish-yellow, bony membrane covered with normal mucous membrane. The height-index of the palate about 100. On both sides the diaphragm was destroyed by galvano cautery.

The author found 61 cases described in literature. Most of them had a bony membrane; exceptionally it was membranous. The diagnosis is not difficult.

John Fred Fischer.

Remarks on the Vegetations on the Sides of the Naso-Pharynx and Description of an Instrument for the Removal of the Same.

Jorgen Moeller, *Hospitaletidnrde*, No. 20, 1903. (From the Clinic for Diseases of the Ear, Nose and Throat of the Commune Hospital, Prof. Dr. Holger Mygind.) The question of the appearance of the lateral vegetations is an old source of debate which must now be regarded as settled. They appear as long prominences, which lie chiefly in the Rosenmueller's groove; usually they affect both sides. The diagnosis is not always easy, and often can be made only when the true pharyngeal tonsils have been removed. The lateral vegetations are comparatively frequent in adults, which condition depends on the slight tendency of the vegetations toward spontaneous evolution, which, itself, without doubt is due to their firm consistency. The symptoms are the same as in ordinary adenoid vegetations.

The treatment in every case consists of instrumental removal, but the usual instruments do not suffice. Prof. Mygind, therefore, has constructed for this purpose a pair of adenotomes, one for the right and one for the left side. The fenestre is small (12 mm.) and long (30 mm.) and bent upward in a right angle so that the ascending part is 23 mm. high. Furthermore, the upper part of the handle is bent sideways in an obtuse angle (about 165°) so that the knife easily enters into the lateral furrow of the naso-pharynx. By means of this knife the lateral vegetations are easily removed by one cut, and experience teaches that the tubal lips are in no way injured thereby.

John Fred. Fischer.

A Factor in the Etiology of Distorted Nasal Septa.

Charles E. Quimby, New York. (*The Medical News*, March 12, 1904.) Dr. Quimby thinks that deflected and distorted septa are in many cases developmental defects and require no other cause for their explanation than pure chance. In some cases the superior maxillary bones unite at an unduly acute angle, while the vomer and triangular cartilage, one or both, fail of proper articulation with the maxillary, palate and ethmoid bones. From this point the production of deflected and distorted septa is merely a question of mechanics.

A case is related in which a young girl of 11 years of age, previously a nose breather, developed a tendency to mouth breathing. Examination showed a decided deflection of the cartilaginous septum with general hyperemia and swelling of the membranes. The left plate of the vomer was bent sharply outward posteriorly and was not in articulation with the palate bones in the central line. There was nothing abnormal in the pharynx. Local treatment accomplished nothing, Her teeth were triangular and had come in very irregularly. while the two lateral incisors had their inner edges rotated backward and the whole tooth carried inward until it was overlapped by the central incisor fully one-half its width. With the aid of a band and a small jack-screw, the central incisors were separated a little over an eighth of an inch, while the teeth under pressure had not been obviously moved in the bone. All tendency to mouth breathing soon disappeared, and an examination showed marked decrease in the flection of the cartilage but no appreciable change in the vomer. Condition of perfect respiration has continued for three years. The author regards the bending of the septum as due to imperfect articulation and undue vertical pressure from the developing maxillary bones, and that this pressure was relieved by separation of the maxillae and that the cartilage was pressed into the groove thus formed. He thinks that irregular teeth, high palatine, or narrow alveolar arch and distorted nasal septum should be treated by the dentist and rhinologist together.

Further observation and work along this line seem to be in order. *Richards.*

III.—MOUTH AND PHARYNX.

The Recognition and Treatment of Some of the Pharyngeal Lesions of Syphilis.

Lewis S. Somers, Philadelphia. (*The Medical News*, March 12, 1904.) The author has found in the erythematous stage that mercury is essential and prefers the protiodide in one-quarter to one-third grain doses two or three times daily, together with an astringent gargle of rhus gla ra. For the mucous patch he uses the same form of mercury, together with an occasional application of 20 to 50 per cent. solution of nitrate of silver. In some cases, however, the silver salt is of no material aid. He then uses chromic acid applied locally by moistening a few crystals on the end of an application tightly wound with cotton. In the mucous patch seen well on during the early tertiary stage of syphilis, mercury is often of no benefit; on the contrary, occasionally aggravates the condition. Three to five-grain doses of potassium iodide will usually produce marked relief. For the tertiary stage where the syphilitic ulceration is marked and the tissues frequently break down within a few hours, the destructive process is to be checked in the very shortest time possible. He begins with iodide of potash in 15 to 20 grain doses three times daily, increasing the amount by five-grain doses until a favorable action upon the syphilitic process is observed or tolerance has been reached. One, two, or three hundred grains daily may be necessary, and the amount used must depend entirely upon the result obtained. Mercury in the form of bichloride or protiodide is also to be administered, and in severe cases should be given by hypodermic injection or inunction. Necrosed bone is to be removed when it has separated from the surrounding tissues. *Richards.*

IV.—LARYNX.

Partial Extirpation of the Larynx for Carcinoma.

George F. Cott, Buffalo, N. Y. (*The Jour. Amer. Med. Asso.*, December 5, 1903.) There was a large growth involving the entire left lateral thyroid cartilage with infiltration of the right arytenoid, portion of which examined microscopically showed it to be carcinoma. Incision was made three inches in length, the thyroid cartilage separated from its attachment, larynx opened. On opening it was found that only one side was apparently affected, so that only the left thyroid and left cricoid were removed. Tracheal tube inserted. No glandular structures found enlarged. Tracheal tube had to be worn but the recovery was speedy, patient walking about in three days. Four months after operation there was difficulty in swallowing, together with the formation of a large swelling in the neck and apparently secondary infection of the carcinomatous process. Treatment with the x-rays caused another disappearance after eleven treatments, and on May 1, 1903, case is reported as entirely well.

Through the courtesy of Dr. Cott, the reviewer had an opportunity of seeing this patient on April 1, 1904, eleven months after the time referred to in the paper, and there had apparently been no further recurrence of the growth. By putting the finger over the tracheotomy opening the patient could speak very comfortably. *Richards.*

V.—MISCELLANEOUS.

Prelimary Communication on the Treatment of Lupus of the Upper Air Passages by Radium.

Dr. V. Delsans. (*La Presse Oto-laryngologique Belge, No. 81.*)

The author is one of the first who studied the influence of radium. rays on lupus of the mucous membrane. He uses 20 milligr of radium, 6 radium (250 frcs.) enclosed in a small thin glass bottle fixing it for the larynx on the end of a flexible handle and on a straight one for the nose and the pharynx. Beginning with one minute he gradually increased to four minutes daily. He finds early that there is anemia of the mucous membrane and that the patients are subjected to a slight feèling of constriction, followed by a cold sensation behind the sternum. In one case of lupus of the larynx he saw several hours after the sixth session. edematous swelling of the epiglottis and redness of the vocal cords, causing the patient some trouble in swallowing and breathing. This soon disappeared, however, upon the external application of cold. He thinks the improvement he gets by radium, much greater than by any other agent used now.

Beside lupus, he treated cases of ozena and tuberculosis laryngitis. These cases, however, are still of too recent date to permit any conclusion. He proposes to call the treatment with the radium X-rays, radium therapy, contrary to the

X-rays of the radiotherapy. Finally he gives the literature on the subject. *Meyjes.*

Lupus of the Respiratory Mucous Membrane, and the Treatment Carried Out in Finsen's Medical Light Institute.

Hans. B. Christiansen. (*Ugeskrift for Lager*, No 23, 1903.) Among about 1,000 lupus patients treated in the last 6 years at the light institute, 3/4 showed unmistakable signs of lupus of the mucous membrane. The disease localizes itself, by predilection, just within the external junction of the respiratory passages, most frequently in the anterior part of the nasal cavity, partially on the septum, partially on the side of the vestibulum nasi, at the anterior end of the concha intima, next often on the lips and superior gums.

The mucous membrane lupus usually demands a very energetic local treatment. In the institute, the treatment is carried out everywhere where the differently formed lenses can be brought, and where the light can be continually directed. This is possible at the anterior part of the gingiva labialis, the anterior portion of the vestibulum nasi, and the tongue. The light treatment cannot be used in the more hidden mucous membranes. The treatment takes place in seances of the same length as in skin lupus, and the result is almost as favorable as in skin lupus.

In places where the light treatment cannot be used, the galvanocaustic is the main remedy. The lupus nodules are destroyed and the needle is not put in the healthy tissue. The disinfectants used were iodine and sublimate, the latter in solution of 10 per cent. for nasal tamponade. The carrying out of the treatment daily and for a long time is of the greatest importance. For home treatment, tamponing the nose with sublimate, and diligent cleansing the mouth.

John Fred. Fischer.

A Study of Normal and Pathological Conditions of the Bursae of the Neck. With Special Reference to the Subhyoid Bursa.

Willis S. Anderson, Detroit. Michigan. (*The American Journal of the Medical Sciences*, March, 1904.)

The anatomy of the bursae of the neck is considered in detail, together with the formation of cysts in these bursae. The subjective symptoms which cysts in these bursae produce are comparatively few. They develope slowly and are not painful or tender to the touch, varying in size from a slight swelling to that of an orange, but usually that of a hazel-nut. They are found just below the hyoid bone in the median line, or just to one side, firmly attached to the underlying tissue, but the skin over them is movable. Fluctuation is or is not present according to the character of the contents. They may remain for years not appreciably changing in size; may disappear spontaneously; (this is rare) may spontaneously open, or open as the result of local treatment, and leave a chronically discharging sinus, or may become infected and form an abscess.

The writer relates two cases of his own and refers to those found in literature. His first case was a girl aged 12. The tumor was about the size of a marble, moved with the hyoid bone but did not seem to be attached to the body of this bone; seemed to be of a cystic nature; no evidence of inflammation. Operative treatment being declined, at the end of a year tumor was found to have completely disappeared.

Second case in a woman aged 43. Swelling about the size of a large marble, cystic in character, thought to be due to the pressure of a high collar. No constitutional symptoms. Tumor decreased in size, then increased, again diminished, but never entirely disappeared. He does not think that the internal use of diuretics, iodides, mercurials, or other absorbents have any beneficial effect in bursal affections. Simple incision with drainage is of no avail. Drainage of the sac and use of local irritants may be successful or may cause failure. The difficulty is to get the local irritant in contact with all parts of the sac. Complete extirpation of the cyst is the most satisfactory method of treatment. Weir injected the sac with melted paraffin, allowed it to harden, and then dissected out the sac entire. This method deserves further trial. *Richards.*

Catarrh and Predisposition,

B. M. Behrens, Minneapolis. (*Northwestern Lan-*

cet, January 1, 1904.) The author regards the pathogenesis of most functional and pathological affections of the upper respiratory tract, eye and ear, to be pathologically very nearly the same thing, namely: a reflex vasomotor paresis. He has found that cauterization of tender spots in the nose, after thorough application of cocaine and adrenalin, will cure very many of the cases of so-called catarrh, and that the retrograde changes in the mucosa of the throat and nose are the result of irritations in the nose. He is even inclined to regard pneumonia as a reflex disorder rather than primarily a bacterial disease. *Richards.*

The Rational Treatment for Mouthbreathing.

W. H. FITZGERALD, Hartford, Conn. (*Medical Record*, September 5, 1903.) The author is opposed to the use of the spray, douche and solution treatment, regarding them as contrary to nature and never to be practiced. They are often excitants, not only to the nose but to the accessory cavities and ear. Nose breathing, in the absence of anatomical causes preventing it, can be brought about through practice. At night he uses a mouth guard consisting of a small strip of adhesive plaster (zinc oxide) worn vertically across the center of the mouth, and during the daytime has the patient breathe forcibly through his nostril at the rate of one respiration per second for ten seconds and this exercise repeated eight or ten times during the day. A permanent patency of the Eustachian tube can be brought about by nasal breathing, while the Eustachian catheter is often harmful, acting as a mechanical irritant, and thus assisting the progress of an already thickened and, perhaps, irritable membrane. *Richards.*

Treatment of Cervical Adenitis Due to Tonsillar Infection.

ALBERT E. ROGERS, Boston. (*Medical Record*, Nevember 28, 1903.) The author thinks that many cases of cervical adenitis have their origin in infection through the lymphatics from the tonsils and that cervical adenitis in children and young adults is commonly associated with hypertrophy of either the faucial or pharyngeal tonsil.

He suggests that in allcases where the cervical glands are not already broken down the tonsils be removed before resorting to an incision through the skin, and he appends the histories of five such cases, in all of which, after thorough extirpation of the tonsils under ether, the enlarged glands in the neck disappeared in periods of a few weeks to six months. *Richards.*

Intratracheal Injections: Experimental and Clinical Study of Their Value in Diseases of the Lungs.

Willis S. Anderson, Detroit, Mich. (*The Journal of the Michigan State Medical Society*, March, 1904.) The author finds that considerable quantity of water or olive oil can be absorbed from the bronchi and trachea without irritation, and has for several years been in the habit of treating pulmonary cases locally through the medium of olive oil as a vehicle for the administration of remedies. He has used the various essential oils, iodine, iodoform, guaiacol, menthol, and many others, and finds that the drugs are less irritating than when water is used as a medium, and the absorption of the oil adds so much nutriment to the body. Sedatives can also be used in the same way.

This treatment is used for simple bronchial as well as for the more severe tubercular affections. The solution should be warmed to body temperature before the injection is made.

Cases illustrating the value of this treatment are referred to. *Richards.*

Esophageal Obstruction Caused by Swallowing the Upper Alveolar Plate.

Grorge F. Cott, Buffalo, N. Y. (*The Journal of the American Medical Aseociation*, December 5, 1903.) The plate was swallowed during eating; was located by means of the x-ray; found immediately behind the sternal notch. The center of the plate was two and one-quarter inches below the thyroid cartilage. The incision was made on the outer side of the trachea, the tissue separated between the muscles and carotid sheath until the esophagus was located. It was opened, the plate grasped with forceps, carefully rotated, and removed. The wound was sutured and the rest of the cavity packed with gauze. The wound closed at the end of nine days, during which time no food was allowed to pass down the esophagus, the patient being nourished entirely by the rectum. *Richards.*

The Effect of Erysipelas upon Atrophic Rhinitis: with Report of Case.

Lewis S. Somers, Philadelphia. (*The Medical News*, August 29, 1903.) The author reports a case of severe and very troublesome atrophic rhinitis which was very much improved and practically cured following and apparently the result of, an attack of facial erysipelas lasting about two weeks. The improvement has continued. Two somewhat similar cases of Francesco are also referred to. *Richards.*

BOOK REVIEWS.

NOSE AND THROAT FOR THE GENERAL PRACTITIONER. By George L. Richards, M. D., Fellow American Laryngological, Rhinological and Otological Society; Fellow American Otological Society; Associate Editor Annals of Otology, Laryngology and Rhinology; Otologist and Laryngologist Fall River Union Hospital, Fall River, Mass. Price $2.00. Published by INTERNATIONAL JOURNAL OF SURGERY CO., N. Y.

Most books upon special subjects in medicine purporting to be written for the general practitioner fall short of the mark or overreach the point of view of the general practitioner. The writer, as a rule, will dwell upon subjects which are of great interest to him, but with which the practitioner has little or nothing to do; and on the other hand he takes for granted many things which the practitioner has really had no opportunity of learning. Dr. Richards, in his little book, seems to have struck the happy medium; in that every department of the subject is presented in a way tangible to the general practitioner without being too elemental. Upon these grounds the book is to be heartily recommended. Dr. Richards has utilized his immense clinical experience in a way that brings the whole subject clearly and understandingly to the readers of his book.

ESSENTIALS OF DISEASES OF THE EAR. Arranged in the form of Questions and Answers. By E. B. Gleason, S. B., M. D., Clinical Professor of Otology, Medico-Chirurgical College, Philadelphia; Surgeon in Charge of the Nose, Throat and Ear Department of the Northern Dispensary, Philadelphia; One of the Laryngologists of the Philadelphia Hospital. Third edition, thoroughly revised. W. B. Saunders & Co., Philadelphia and London.

This eminently practical little book will be found of considerable service by students and practitioners in medicine. The questions are pertinent and the answers clear and logical.

ERRATA.

In the September number of the ANNALS OF OTOLOGY, RHINOLOGY AND LARYNGOLOGY for 1903 on Page 531, you quote me as saying, "About 57 per cent. of all cases of brain abscess were otitic in origin." This is an error made by the stenographer; what I *did* say was, "About 37 per cent. of all cases of brain abscess were otitic in origin." Also on page 533 of the same number you quote me as saying, "Pilocarpine should be administered hypodermically in full doses for a week or more. This is another error of the stenographer; what I did say was, "In administering pilocarpine hypodermically, it should be given in full doses 6 weeks, 2 months or more."

Will you kindly correct these errors in your next issue and oblige

Yours very sincerely,
JAMES F. MCKERNON.

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AND
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XXIII.

A STUDY OF THE DEVELOPMENT OF THE NOSE AND ITS ACCESSORY CAVITIES.*

BY J. M. INGERSOLL, A. M., M. D.

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This paper must be considered as only a preliminary one, for the field is so broad that the author has been unable to cover it exhaustively.

The primary origin of the olfactory organ is not well understood: possibly it may have arisen by a modification of primitive integumentary sense organs.

In its simplest form the olfactory organ consists of two pit-like depressions of the integument of the snout opening on the surface by external nostrils. It is lined by an epithelium which is connected with the brain by the olfactory nerves. The olfactory organs of all the true fishes consist of sack-like depressions which do not communicate with the mouth. In the course of development each external nostril is divided by a fold of skin into two openings, thus forming an anterior and posterior nostril.

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*From the Pathological Laboratory and the Laboratory of Clinical Microscopy of the Western Reserve University.

Dipnoi are fishes which resemble amphibia in several ways. They live in shallow streams and bury themselves in the mud during the dry season. The air bladder is converted into a funtional lung and the nasal cavities communicate with the mouth as well as with the exterior. In consequence of this, anterior or external, and posterior or internal nostrils (choanae) can be distinguished and a free passage is thus formed through which air passes and the olfactory organ takes on an important relation to the respiratory apparatus.

In amphibia the structure of the olfactory organ becomes modified in correspondence with the change in the mode of respiration. The nasal chambers become differentiated into an olfactory and respiratory portion and an extension of the olfactory surface takes place by the formation of one or more prominences on the floor and side walls of the nasal cavities. These prominences correspond to the turbinals of higher forms

Glands, situated under the olfactory mucous membrane, can now be found, and the secretion from these glands moistens the mucous membrane of the nasal cavity.

In reptiles, owing to the growth of the brain and facial region and the formation of a secondary palate, the olfactory organs from reptiles onward gradually come to be situated more ventrally beneath the cranium.

The secondary palate is formed by the pterygopalatine arch and is well developed in all reptiles. In snakes and lizards this arch is more or less movable and free from the base of the skull, but in crocodiles it meets with its fellow in the median line. and the shelf-like palatine processes of the superior maxillary bones unite with the palatines. Thus a secondary roof is formed to he mouth, distinct from the true (sphenoidal) base of the skull. The cavity thus formed closes in the posterior prolongation of the nasal chambers which consequently becomes sharply differentiated from the mouth and the posterior nares open farther back into the pharynx or nasopharynx instead of the mouth.

In birds there is an anterior nasal chamber, lined by stratified epithelium, and an olfactory chamber situated above and posterior to the former. The olfactory chamber contains the ethmoidal turbinal, the form of which varies greatly. It may be simply a prominence or more or less rolled upon itself.

Corresponding to the much more marked development of the facial portion of the skull, the nasal cavity of mammals is much larger and there is a more extensive development of the turbinals.

The turbinals become very complicated and form a sponge-like labyrinth, the cell-like compartments of which are lined throughout with mucous membrane. The number of olfactory turbinals varies considerably, but in most mammals there are at least five. These olfactory turbinals are generally described as ethmoidal turbinals because they are usually supported by the ethmoid bone. The turbinal of lower vertebrates corresponds to the maxillary turbinal in mammals situated in the lower or anterior part of each nasal chamber and supported by the superior maxillary bone.

The maxillary turbinal in mammals no longer possesses an olfactory epithelium and in microsmatic mammals (seals, whales, monkeys and man), the lower portion of the ethmoidal turbinal also loses its olfactory epithelium. This change in the mucous membrane of this portion of the nose corresponds to the change in function, for its principal function now is to clean, warm and moisten the inspired air.

The author wishes here to acknowledge his indebtedness to Dr. Robert Wiedersheim's book "Comparative Anatomy of Vertebrates," from which the statements above have been compiled. With this description of the development of the olfactory organ as a guide, let us study some members of the different classes of vertebrates more carefully.

Fish. The olfactory organ in the Lake Erie white fish is composed of two symmetrical cavities situated in the anterior part of the head and separated from each other by a thick septum.

Each cavity is somewhat hemispherical in shape and communicates with the exterior by two small round openings in the roof of the cavity. These openings are situated one behind the other and so may be designated as anterior and posterior nostrils.

The external wall and floor of each cavity is smooth, but the median wall (septum) supports a rounded prominence, from which radiating processes extend into the nasal cavity (Plate I, 3). These processess correspond to the turbinals in higher vertebrates. The two nostrils open just above these processes and thus allow a free circulation of water through the cavity (Plate I, 1 and 2).

The nasal cavity is separated from the mouth by a rather thick wall, but in the posterior inferior part of the cavity there is a slight depression extending downward toward the mouth (Plate I, 5).

TURTLE. The olfactory organ in the turtle consists of two symmetrical cavities separated from each other by a thick septum. The respiratory part of each nasal fossa is a tube-like structure extending doward and backward and opening into the anterior part of the mouth (Plate II., Figure A, 1 and 4). The olfactory region is a spherical chamber situated above the respiratory region with which it communicates by an oval opening in its floor. (Plate II. and IV., Fig. A and D, 3). Projecting into each fossa, from the lateral walls, there are two prominences (Plate II. and IV., Fig. A and D, 11) which correspond to the turbinals in higher forms. These prominences form the anterior and inferior boundaries of the olfactory region. The anterior prominence extends downward across the nasal fossa and unites with the septum, thus partially subdividing the respiratory region into an anterior and posterior portion.

DUCK. The nasal fossae in the duck are two symmetrical cavities which communicate with each other at their anterior and posterior extremities, the septum being incomplete at these points.

The maxillary turbinal is shaped like an inverted T, attached to the roof of the nasal chamber and is suggestive of the turbinal with a double coil seen in higher forms of vertebrates (Plate V. and VI., Fig. A, B and C, 1).

There are two ethmoidal turbinals. The anterior inferior one (Plate V. and VI., Fig. A. E. F. and G. 2) is a double coil of which the superior coil curves upward describing nearly a complete circle; the inferior coil is scroll-shaped making two turns within itself (Plate V. and VI., Fig. G, 2).

The superior ethmoidal turbinal is a simple structure (Plate III, Figures A and G, 3), consisting of a rounded prominence from which two irregular processes extend downward into the nasal fossa.

There are no accessory sinuses of the nose but in addition to the numerous small air cells the greater part of each superior maxillary bone is occupied by a large air cell (Plate V. and VI, Figures F and G, 10). These air cells, like the other pneumatic cells in the bird's skeleton, make the bones lighter in weight.

Dog. The dog's nose is a very complicated structure. The maxillary turbinal is attached to the superior maxillary bone by a single shelf-like process which is much broader at its posterior than at its anterior end. From this process, numerous curved branches are given off, which form an intricate labyrinth almost completely filling the anterior part of each nasal fossa. (Plates VII, VIII, IX and X, Fig. A, B, C, D, and E, 1).

The ethmoidal turbinal is an exceedingly complex structure. It consists of a mass of thin delicate scrolls of which at least five radiate from the convex surface of the cribiform plate. It articulates with and is supported by the sphenoidal, frontal, nasal and superior maxillary bones and *some of its numerous branches extend into all the accessory cavities of the nose.* (Plates VI. to X. Fig. A, B, C, D, E, F, G and H, 2). One scroll extends forward over the maxillary turbinal and anteriorly it is supported by *a process which is attached to the external lateral wall of the maxillary sinus.* (Plates VII. to X., Fig. B, C, D, F and G, 12).

The ethmoidal cells are cavities in the scrolls of the ethmoidal turbinals or cavities between the scrolls and the surrounding bones of the skull. (Plates VII, VIII, IX and X, Fig. B, C, D, H, J and K, 4).

The maxillary sinus is hollowed out of the superior maxillary bone and is only partially separated from the nasal fossa by the ethmoid bone. (Plates VI to X, Figures B, C, F and G, 11). The ostium maxillare is large and extends downward to the floor of the cavity, opening into the nasal fossa in the inferior meatus just posterior to the maxillary turbinal. (Plate VI and IX, Fig. A, C and D, 3). The hiatus semilunaris is a groove formed in one of the processes of the ethmoidal turbinal and leads directly from the frontal and ethmoidal cells into the maxillary sinus so that these cells all drain into the maxillary sinus and thence into the inferior meatus (Plates VII and IX, Figures C and F, 14). The frontal sinus is situated between the two plates of the frontal bone and *its anterior inferior part is occupied by a double coil of the ethmoidal turbinal which is attached to the external wall of the sinus* (Plates VII,VIII, X. and XI, Fig. A, B, C, D, H, I and K, 5 and 6).

The sphenoidal sinuses (two in number) are separated from each other by a rather thick septum in the median line and *are nearly filled by scrolls of the ethmoidal turbinal* (Plate XI, Fig. I and K, 8).

The posterior part of the vomer is expanded into two lateral wings which unite with the ethmoidal bone and thus divide the posterior part of each nasal fossa into two superimposed cavities (Plates VII to X, Figures D, F, G and H, 18). The superior cavity contains most of the ethmoidal turbinal and is distinctly an olfactory chamber. The inferior cavity is simply a tube-like structure forming a direct communication between the anterior half of the nasal fossa and the nasopharynx, (Plates VII to X, Figures A, D, F and G, 21).

The function of the accessory cavities of the nose in the dog, seems to be to provide space for the tremendous development of the olfactory turbinals, to conduct air over the external surface of these structures and to furnish a system of drainage for them.

Monkey. The olfactory organ in monkeys varies considerably in different species, but there are certain characteristics which are constant.

The maxillary turbinal is a comparatively simple structure and consists of a single or double coil. The superior coil is usually smaller than the inferior coil and is frequently only rudimentary or absent entirely. The turbinal is supported by the superior maxillary bone and its base forms a large part of the internal wall of the maxillary sinus.

The ethmoidal turbinals vary in number from two to five and are situated above the maxillary turbinal. They are also comparatively simple structures. *In some species they extend into the posterior superior part of the maxillary sinus.* The maxillary sinus is always present and opens into the middle meatus. *On its outer wall there is a bony ridge*, in some species slight, in others very prominent, *which partially subdivides the sinus.* (Plate XIII, 7.) This ridge is, I think, a rudiment of the ethmoid turbinal and probably accounts for the bony partition frequently seen in the maxillary sinus of man.

The ethmoidal cells vary greatly in size and number. In some species there are none, in some a single group opening into the middle or superior meatus, according to their location, and in others two groups, the anterior cells opening into the middle meatus and the posterior cells into the superior meatus. (Plate XII, 3.)

There are no frontal sinuses in most of the monkeys' skulls which I have examined but the frontal bone in this region is composed of cancellous tissue, and in some of the higher orders of monkeys the most anterior ethmoidal cells extend up between the two plates of the frontal bone. (Plate

XII, 1.) In the chimpanzee there is a well developed frontal sinus in each frontal bone with a thin bony septum in the median line. This sinus communicates directly with the anterior ethmoidal cell. (Plate XIII, 1.)

In those specimens in which there are no frontal sinuses and the ethmoidal cells are small or absent also, the orbits are situated very close together and this juxtaposition of the orbits may account for the disappearance of the frontal and ethmoidal sinuses, these sinuses having been crowded out by the orbits.

The sphenoidal sinuses vary greatly. In those monkeys in which the turbinal structures are simple and rudimentary, the sphenoidal sinuses are small or have disappeared entirely, but where the turbinals are less rudimentary, one or more sphenoidal sinuses are present in each lateral half of the sphenoidal bone and some show distinct evidences of turbinals extending into them, (Plates XII and XIII, 5 and 6.)

Man. The general characteristics of the nose and its accessory sinuses in man are too well known to need a detailed description here. There are, however, certain structures which occur frequently enough to be considered fairly constant, and are of importance when studied in relation to the development of the nose. A third ethmoidal turbinal, and more rarely a fourth one, may be present. These structures are evidently rudiment of the more extensive development of the ethmoidal turbinal in lower forms and as is usual with such structures, they occur more frequently in the embryo than in the adult.

The maxillary sinus is sometimes partially divided into an anterior and posterior chamber by a bony partition extending across its floor (Plate XV., Figure B, 5), or up on its external lateral wall. Such partitions are, I think, rudiments of the ethmoidal turbinal which, in the dog, extends down into the maxillary sinus.

The frontal sinus sometimes communicates with an anterior ethmoidal cell (Plate XIV, Figure A 1), or the posterior inferior part of the sinus is encroached upon by the ethmoidal cells, or there are two sinuses in one lateral half of the skull, or the frontal sinus is absent.

The sphenoidal sinus sometimes communicates with a posterior ethmoidal cell or the sinus is divided into two sinuses, one of which opens directly into the nasal fossa and the other into an ethmoidal cell or both open into the superior meatus. (Plate XVII, Figure D, 6 and 7.) These variations are all easily explainable, I think, when they are compared with similar structures in lower vertebrates and are probably reversions to more primitive types.

The variations in the frontal sinuses correspond to the structure of these sinuses as seen in such animals as the dog and the monkey. The division of a sphenoidal sinus into two chambers is caused by a plate of the ethmoidal (or sphenoidal) turbinal extending across the sinus as it does in some monkeys.

Summarizing briefly, we find that the olfactory organ in fishes consists of two sack-like structures, each of which communicates with the exterior by two openings, but the nasal cavities do not communicate with the mouth. The turbinals are represented by prominences on the median wall. In dipnoi the nasal cavities open into the mouth and the nose then becomes a part of the respiratory system.

In reptiles the nasal cavities are subdivided into olfactory and respiratory regions and the turbinal structures are more highly developed. The secondary palate separates the posterior nares from the mouth and the nasal fossae are thus prolonged and open farther back into the nasopharynx.

In birds, the turbinal structures are all more complicated and the ethmoidal turbinals especially show a still higher degree of development.

In macrosmatic mammals (animals which have an acute sense of smell), the turbinal structures are exceedingly complicated scrolls forming intricate labyrinths which occupy the greater part of the nasal cavities. The accessory cavities of the nose all contain olfactory turbinals and are in intimate relation with these structures.

In microsmatic mammals (animals which do not have an acute sense of smell), the turbinals all show evidences of degeneration or reversion, and are comparatively simple structures. The accessory cavities contain little or no true turbinal tissue and their functional activity is lost.

It seems probable, therefore, that in man the accessory cavities of the nose are rudimentary structures.

The foregoing statements are based upon the study of the nose in fishes, frogs, alligators, turtles, birds, dogs, cats, wolves, foxes, bears, beavers, seals, rabbits, guinea pigs, lions, deer, sheep, cows, pigs, buffaloes, horses, elephants, monkeys and man.

I wish to thank Dr. Wm. T. Howard and Dr. L. W. Ladd for the facilities which they have given me for carrying on this work in their laboratories, Dr. R. G. Perkins and Dr. W. B. Chamberlin for doing the photographic work, Dr. C. A. Hamman and the Smithsonian Institute for loaning me material for study.

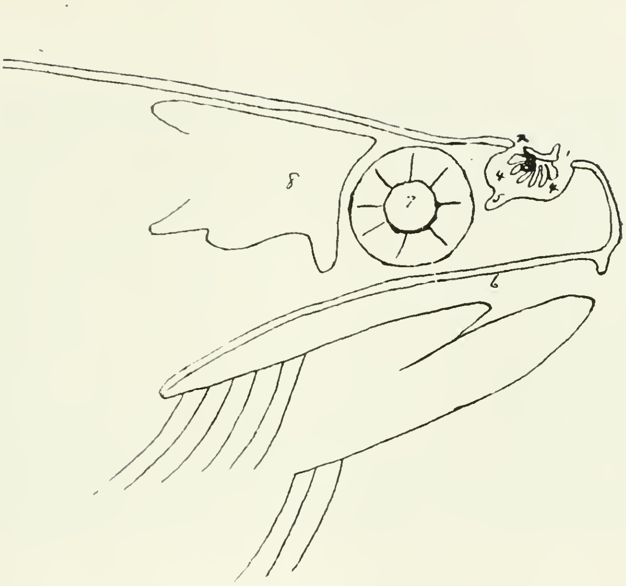

PLATE I.

Somewhat diagramatic drawing of a section through the nasal fossa of a fish.

1. Anterior naris.
2. Posterior naris (both of which open externally).
3. Turbinal.
4. Nasal fossa.
5. Prolongation of the nasal fossa downward toward the mouth.
6. Mouth.
7. Orbit.
8. Brain cavity.

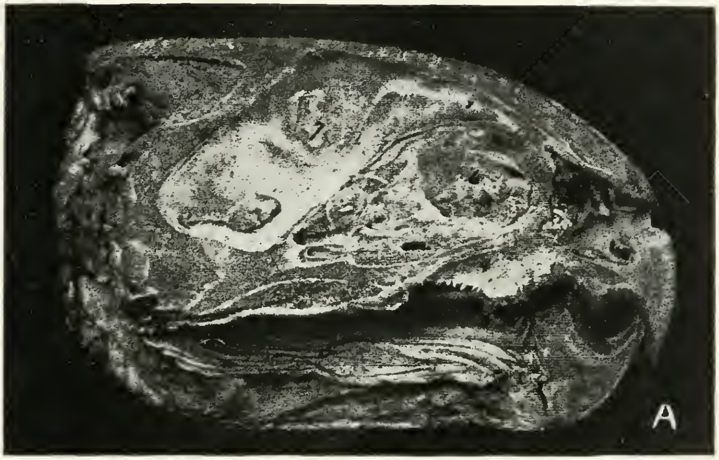

PLATE II.

A. Longitudinal section through the left nasal fossa of a turtle.
1. Anterior naris.
2. Jacobson's organ.
3. Olfactory chamber.
4. Posterior naris.
5. Mouth.
6. Orbit.
7. Brain cavity.
8. Olfactory lobe of brain and olfactory nerves.
9. Septum.
10. Partition between nasal fossae and Jacobson's organ (Figure C). In the right fossa this partition has been cut away.
11. Turbinals.

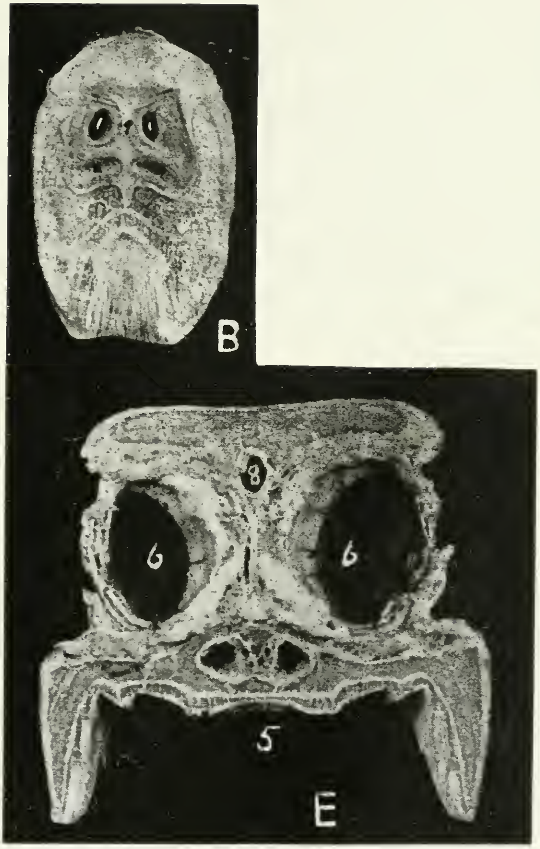

PLATE III.

B. Transverse section through both nasal fossae of a turtle, looking anteriorly, 1—2—9, same as on Plate II.

E. Transverse section through the posterior part of both nasal fossae of a turtle, looking posteriorly, 4—5—6—8, same as on Plate II.

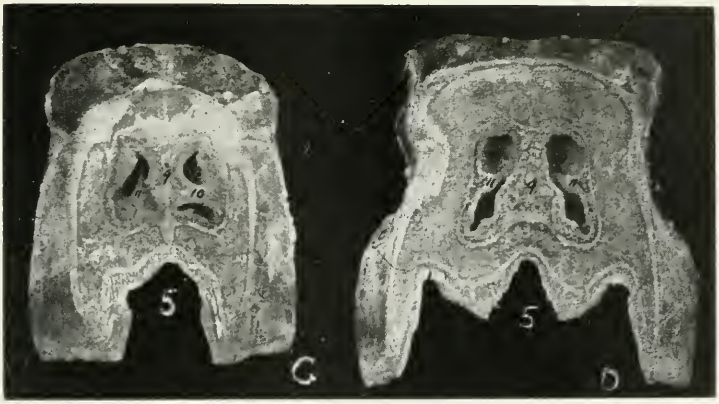

PLATE IV.

C & D. Transverse sections through both nasal fossae of a turtle, looking posteriorly, 3—5—9—10—11, same as on Plate II.

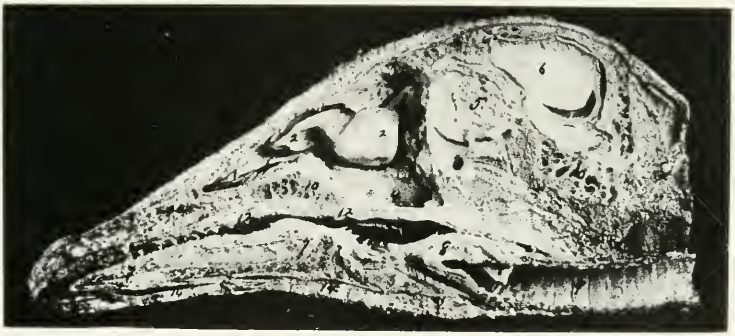

PLATE V.

A. Longitudinal section through the right nasal fossa of a duck.
1. Maxillary turbinal.
2. Inferior ethmoidal turbinal.
3. Superior ethmoidal turbinal.
4. Posterior naris.
5. Eye.
6. Brain.
7. Tongue.
8. Larynx.
9. Trachea.
10. Air cells in the bones.
11. Septum.
12. Roof of mouth.
13. Mouth.
14. Inferior maxilla.

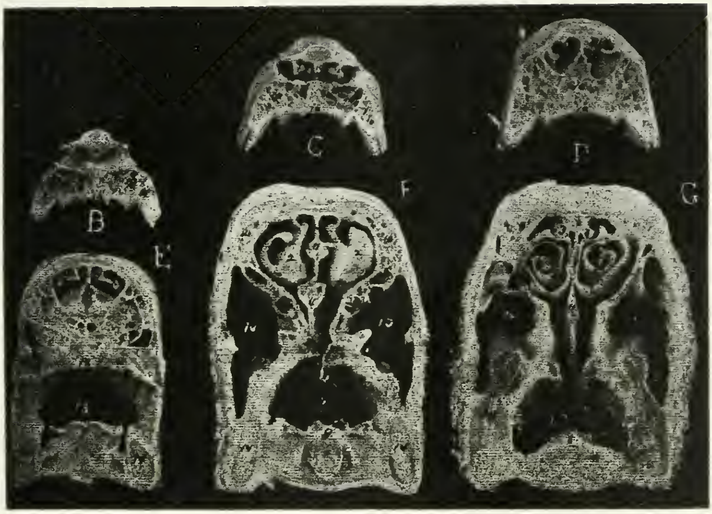

PLATE VI.

Transverse section through both nasal fossae of a duck; B looking anteriorly; C D E F and G looking posteriorly. In B C and D the inferior maxilla is not shown, 1 to 14, as in Plate V.

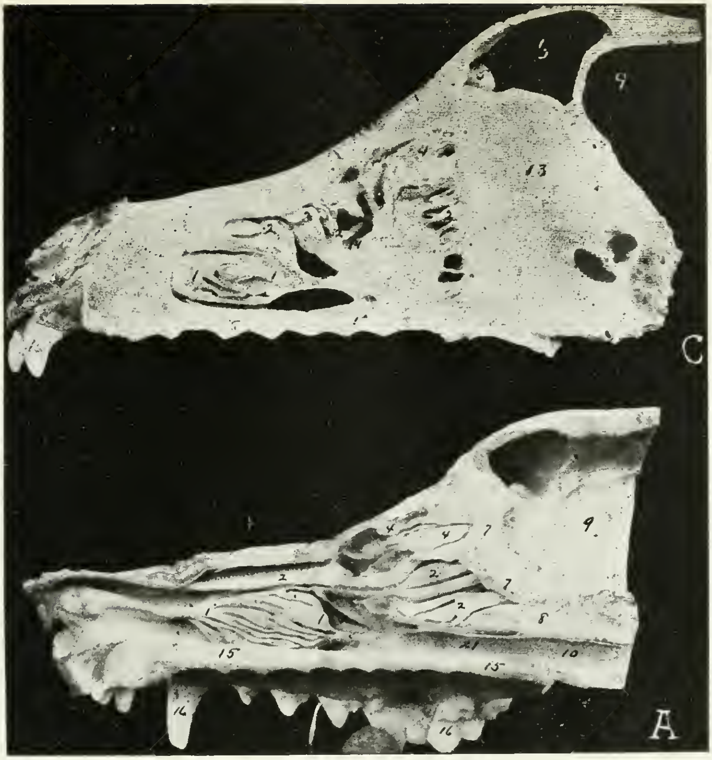

PLATE VII.

A. The right nasal fossa of a dog.

C. Section through the external third of the left fossa, looking toward the median line.

1. Maxillary turbinal.
2. Ethmoidal turbinal.
3. Ostium maxillare.
4. Ethmoidal turbinal in ethmoidal cells.
5. Ethmoidal turbinal in frontal sinuses.
6. Frontal sinus.
7. Cribriform plate.
8. Ethmoidal turbinal in sphenoidal sinus.
9. Brain cavity.
10. Posterior nares.
11. Maxillary sinus.
12. Ethmoidal turbinal extending into the maxillary sinus and attached to its external lateral wall.
13. Orbit.
14. Hiatus semilunaris extending from the frontal and ethmoidal cells into the maxillary sinus.
15. Palate.
16. Teeth.
17. Vomer.
18. Lateral wings of vomer.
19. Septum.
20. Presphenoid.
21. Respiratory tract in the posterior inferior part of the nares.

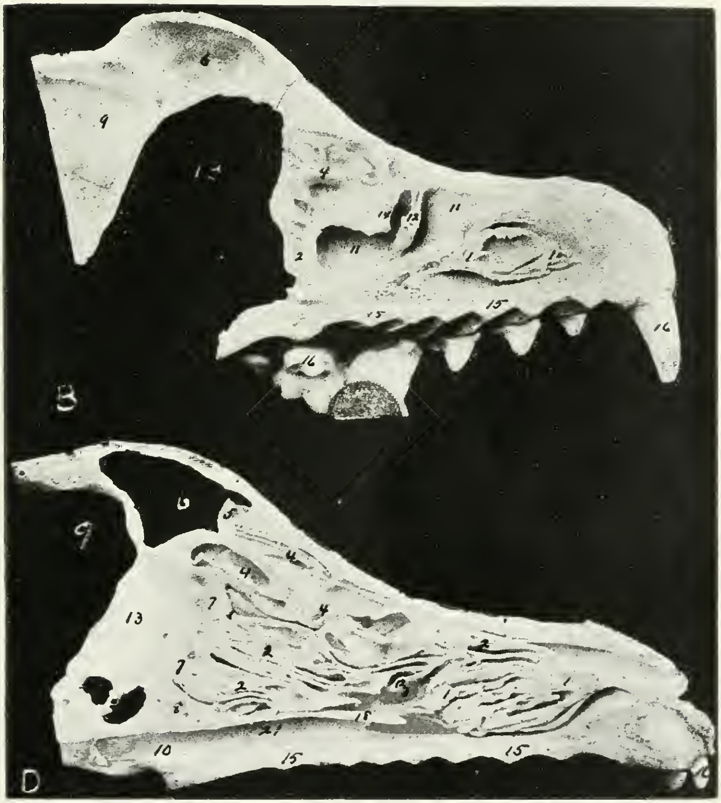

PLATE VIII.

B. Section showing the external third of the left nasal fossa of dog, looking toward the external wall.

D Section through the left nasal fossa, midway between the septum and the external wall, looking toward the latter, 1 to 21, as in Plate VII.

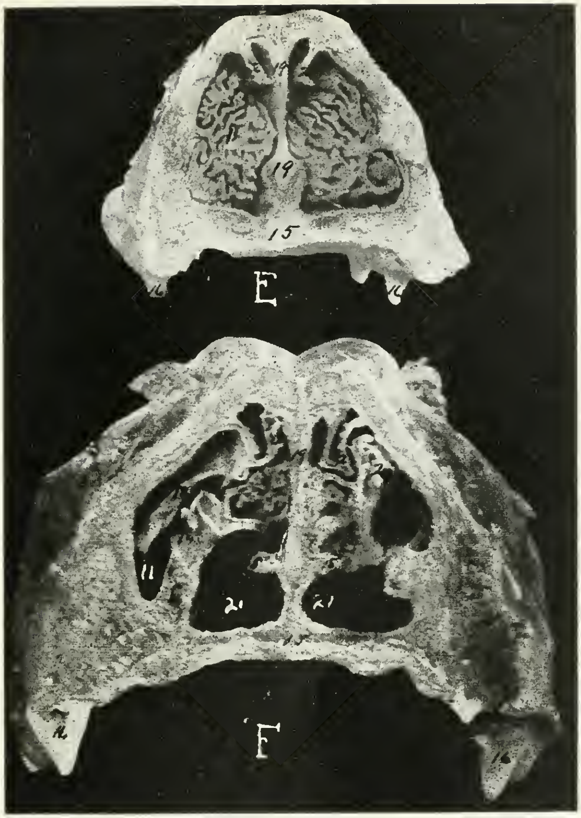

PLATE IX.

Transverse sections through both nasal fossa of the dog, cut slightly obliquely so as to pass through different parts of corresponding structures in each fossa, looking posteriorly.

1. Maxillary turbinal.
2. Ethmoidal turbinal.
3. Ostium maxillare.
4. Ethmoidal turbinal in ethmoidal cells.
5. Ethmoidal turbinal in frontal sinus.
6. Frontal sinus.
7. Cribriform plate.
8. Ethmoidal turbinal in sphenoidal sinus.
9. Brain cavity.
10. Posterior nares.
11. Maxillary sinus.
12. Ethmoidal turbinal extending into the maxillary sinus and attached to its external lateral wall.
13. Orbit.
14. Hiatus semilunaris extending from the frontal and ethmoidal cells into the maxillary sinus.
15. Palate.
16. Teeth.
17. Vomer.
18. Lateral wings of vomer.
19. Septum.
20. Presphenoid.
21. Respiratory tract in the posterior inferior part of the nares.

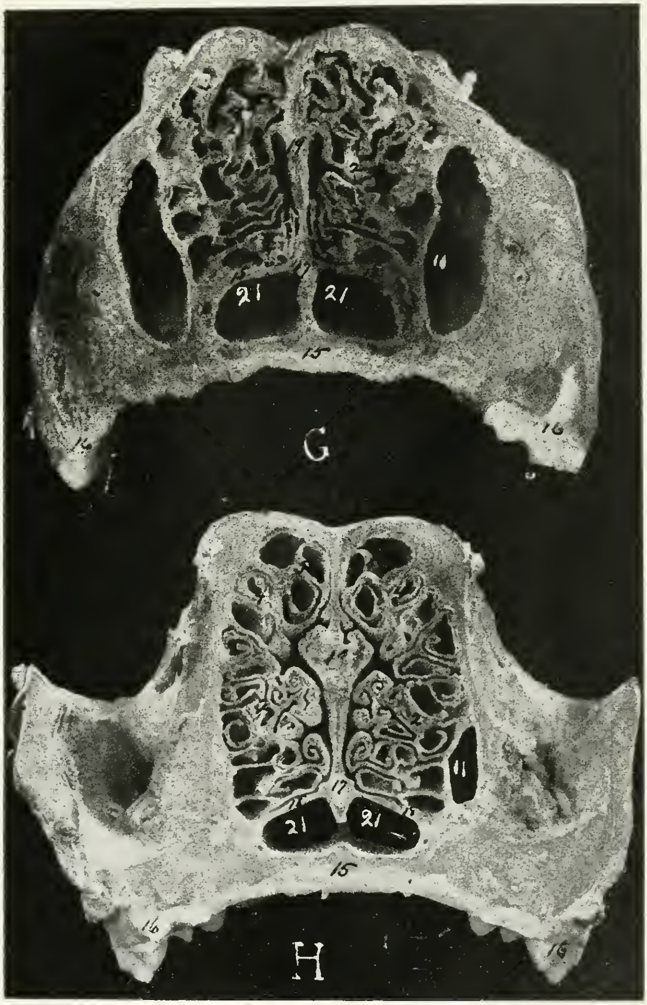

PLATE X.

Transverse sections through both nasal fossae of the dog, cut slightly obliquely so as to pass through different parts of corresponding structures in each fossa, looking anteriorly. Text as in Plate IX.

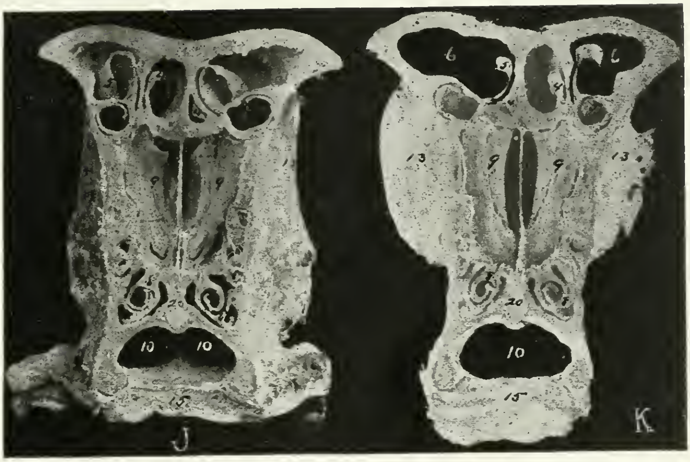

PLATE XI.

Transverse sections through both nasal fossae of the dog, cu slightly obliquely so as to pass through different parts of corresponding structures in each fossa. J. looking anteriorly, K. posteriorly. Text as in Plate IX.

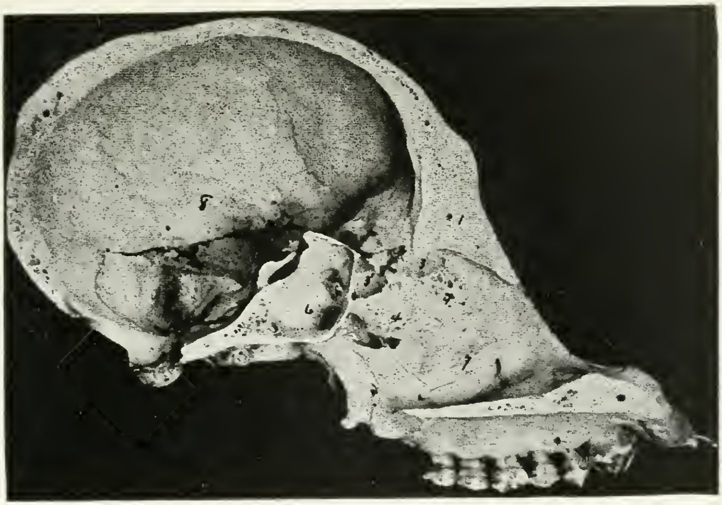

PLATE XII.

1. Frontal bone, cancellous.
2. Cribriform plate.
3. Anterior etmoidal cell.
3.' Posterior ethmoidal cell.
4. Ethmoidal turbinal.
5. Ethmoidal turbinal extending into sphenoidal sinus.
6. Sphenoidal sinus.
7. Maxillary turbinal.
8. Brain cavity.

The turbinals are comparatively simple structures. The maxillary sinus is large and its wall are smooth, except the external lateral wall which presents a decided ridge extending upward to the ethmoidal bone.

The frontal bone is cancellous and there is no true frontal sinus but the anterior ethmoidal cell (3) extends up into the frontal bone.

The posterior end of the ethmoidal turbinal (5) extends into the sphenoidal sinus and divides it into two distinct cavities. The smaller, anterior cavity communicates with the superior meatus through the posterior ethmoidal cell (3'). The larger cavity (6) occupies the greater part of the sphenoidal bone and opens into the superior meatus under that part of the ethmoidal turbinal which extends into the sphenoidal sinus.

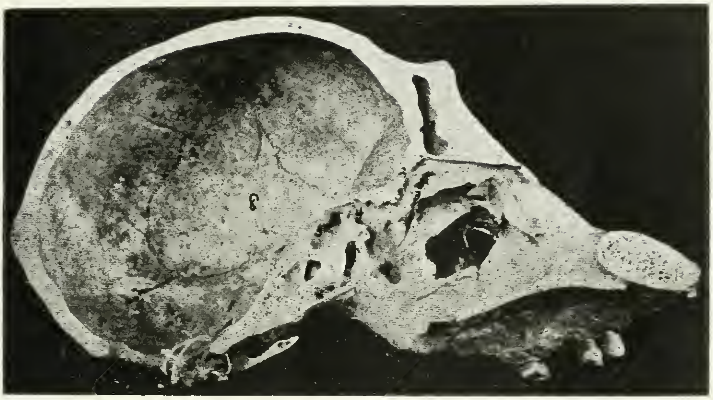

PLATE XIII.

1. Frontal sinus.
2. Cribriform plate.

3, and 4. Ethmoidal turbinal. The ostium of the middle ethmoidal cell is just below the figure 3, and the ostia of the sphenoidal and posterior ethmoidal cells are below the figure 4.

5. Superior sphenoidal sinus.
6. Inferior sphenoidal sinus.
7. Bony ridge on external lateral wall of maxillary sinus.
8. Brain cavity.

In this specimen the maxillary and the inferior part of the ethmoidal turbinal have been lost.

The frontal sinus is large and extends over the orbit; It drains into the anterior ethmoidal cell, which opens into the middle meatus.

The maxillary sinus is large and is partially sub-divided by a bony ridge extending upward and backward across its external latteral wall and roof, and uniting with the ethmoidal bone. This ridge increases in thickness as it ascends and gives off several lateral branches and corresponds to the ethmoidal turbinal which extends down into the maxillary sinus in the dog.

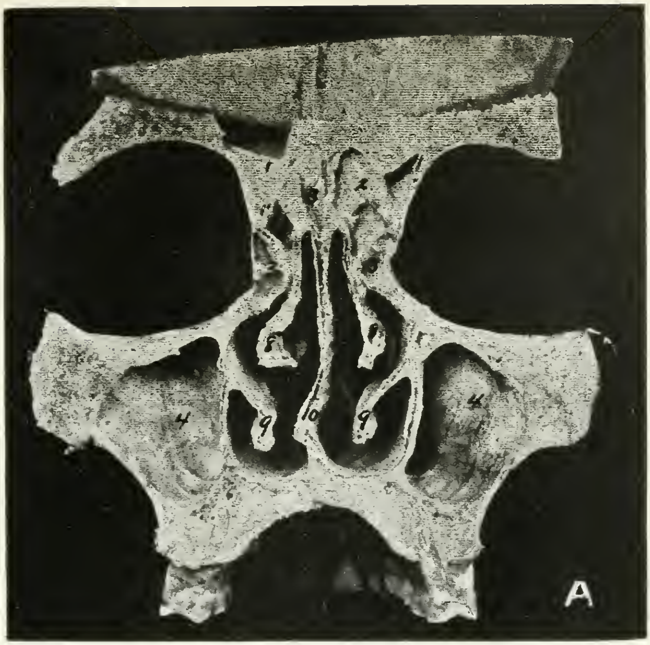

PLATE XIV.

Section through an adult human skull, looking anteriorly.

Text for this plate and the three following:

1. Frontal sinus, opening into a small ethmoidal cell 1', and thence into the middle meatus.
2. Large anterior ethmoidal cells extending upward into the frontal bone.
3. Ethmoidal cells.
4. Maxillary sinuses.
5. Bony partition in maxillary sinus.
6. Large ethmoidal cells extending into sphenoidal bone.
7. Sphenoidal sinuses. The ostiasphenoidalis are just below the figures.
8. Ethmoidal turbinals.
9. Maxillary turbinals.
10. Septum.

This skull shows several interesting rudimentary structures. The left frontal sinus (Plate XIV and XV, 1) communicates with the nasal fossa through an ethmoidal cell. There is no frontal sinus in the right half of the skull but the anterior ethmoidal cell on this side extends up into the frontal bone (Plate XIV and XV 2).

The left maxillary sinus is partially subdivided by a bony partition (Plate XV. 5) which corresponds to the partition usually present in the maxillary sinus of the monkey. One of the large ethmoidal cells contains a distinct turbinal scroll; unfortunately this scroll is in such a position that it does not appear in any of the photographs.

The left sphenoidal sinus is divided into a superior and inferior cavity by a thin bony partition (Plate XVII 6 and 7). This partition is distinctly an ethmoidal structure and springs from the superior ethmoidal turbinal. Therefore I have designated the superior cavity as an ethmoidal cell and also because its anterior part is entirely surrounded by the ethmoidal bone and its ostium is on the external side of the superior ethmoidal turbinal in common with other ethmoidal cells. This bony partition in the sphenoidal sinus corresponds to the extension of the ethmoidal turbinal into the sphenoidal sinus in the orangutan) Plate XII 5).

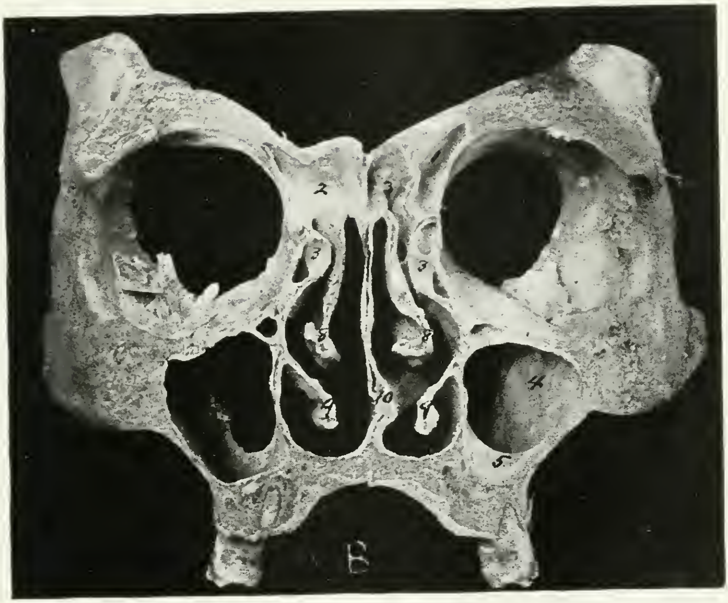

PLATE XV.

Section through the same skull, looking posteriorly. Text as in Plate XIV.

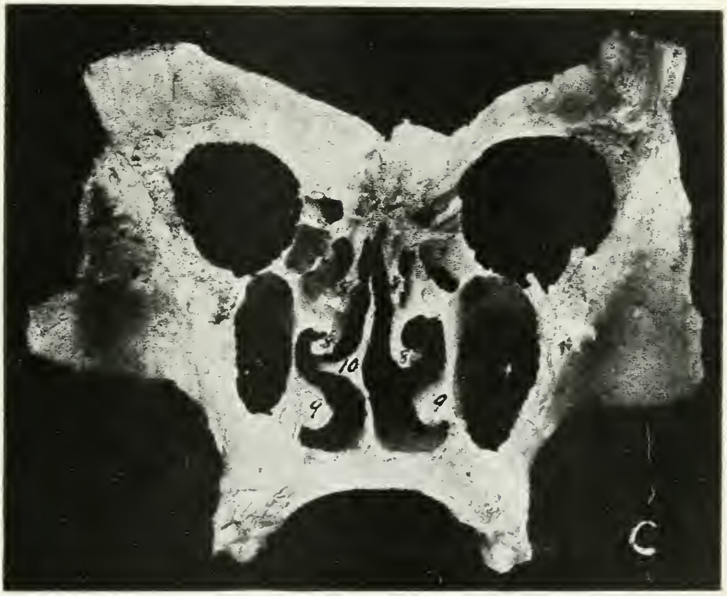

PLATE XVI.

Section through the same skull looking anteriorly. Text as in Plate XIV.

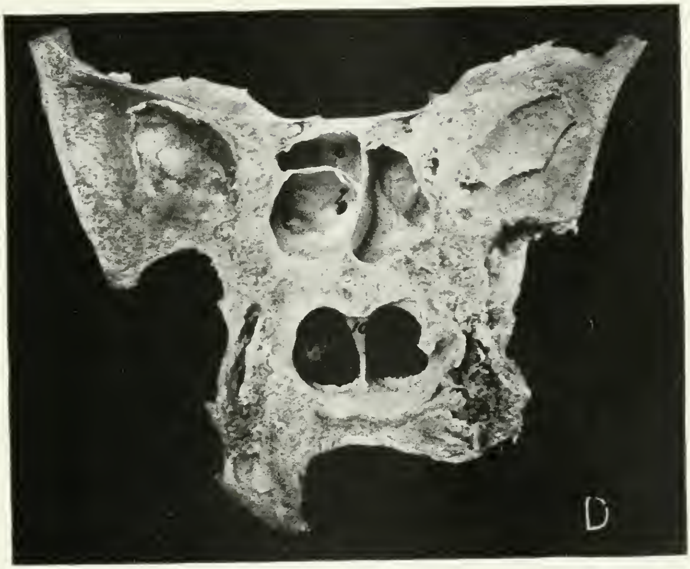

PLATE XVII.

Section through the same skull looking anteriorly. Text as in Plate XIV.

XXIV.

FINAL HISTORY OF A SUPPOSED CASE OF "VOCAL NODULE"—EPITHELIOMA OF THE LARYNX—THYROTOMY—DEATH.*

By Chas. H. Knight, M.D.,

NEW YORK.

At a meeting of this association in 1901 I read a paper entitled "Vocal Nodules," suggested by a supposed case of the disease, the history of which was given in detail. The outcome of the case was so unexpected, and in many respects so instructive, that it seems desirable to place on record its subsequent history.

At the time of my first report laryngeal symptoms had been present more than a year, although the "nodule" had been discovered only about nine months previous. During the summer of 1901, the following winter and the summer of 1902 every effort was made to give the patient the benefit of the best possible surroundings, and the local treatment was restricted to the use of sedative and mild astringent sprays. The voice continued hoarse, with occasional intervals of partial recovery, until aphonia became practically permanent. In October, 1902, the "nodule" had increased slightly in size and prominence, but there was no obvious infiltration of the vocal band or loss of power. There was no pain and there were no glandular enlargements. The patient was extremely discouraged, although her general condition had decidedly improved. Incidentally it may be mentioned that from the first she was possessed with the notion that she had cancer and could not be cured. She would be reassured, but now and again reverted to the idea.

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*Read at a meeting of the American Laryngological Association, June 4, 1904.

About this time she saw several of my colleagues, one of whom removed a fragment of the projecting mass with a cold wire snare. The microscopic examination of this fragment (about one-sixteenth of an inch in thickness) made by an experienced pathologist, showed that the tissue was composed almost solely of epithelial cells having the appearance of a papilloma. The arrangement of the cells gave no evidence of rapid growth. So little submucous tissue was present that no accurate idea of the depth of the cell layer could be formed, but no indication of invasion of the submucosa were seen. The microscopic diagnosis was "papilloma of larynx, malignant tendencies." The latter was based on the following three features; (1.) Unusual amount of chromatin in the nuclei. (2.) Concentric arrangement of cells in whirls or groups of 10 or 12. (3.) Some cell inclusions resembling those seen in carcinoma. There followed an excessive degree of reaction which did not subside. The vocal band became swollen and red, and the neoplasm showed a tendency to creep toward the anterior commissure. Accordingly it was decided to do a laryngo-fissure and let further interference be subject to the state of things thus disclosed. On December 7th, 1902, a thyrotomy was done in the most skillful manner by one of our leading surgeons. Pieces of affected tissue were removed and at once submitted to an expert microscopist, who, after having examined several sections pronounced the lesion an epithelioma, "all the sections showing extensive infiltration." On the strength of this finding all the soft tissues, including the arytenoid of the right side of the larynx were resected. The cavity was left open, packed lightly with gauze, a long tube having been left in the trachea, and the patient was removed from the table in a most excellent condition. She was left in charge of two experienced nurses, with every appliance at hand to meet emergencies, and one of the house staff remained with her until after complete recovery from ether. The operation itself was free from complications and was rapidly done, having been interrupted for about fifteen minutes while the microscopic examination was in progress. The patient passed a quiet afternoon, except for some restlessness at first, and finally fell asleep. Toward evening she suddenly awakened, sprang up in bed, gasping for breath, became cyanosed and presently fell back unconscious. The nurse called a surgeon who reached the bedside almost immediately, at once extracted the tracheal tube, which was apparently in proper place, catheterized the trachea, did artificial respiration and resorted to every possible means of resusitation without avail.

The operating surgeon has courteously placed at my disposal the following comments: "Whether her death was due to a slipping of the tube from the trachea or to pulmonary embolism I am unable to say. I am inclined to believe the former, although both nurses state that up to the moment of her apparent suffocation she had been sleeping quietly, had not coughed, and had made no unusual effort which would have been likely to displace the tube. Moreover, shortly after her return to her room she had vomited slightly and had coughed at intervals without producing such a result."

This case enforces certain lessons that have been often taught, and unfortunately it brings us no nearer the solutiyn of several questions many times asked:

(1.) The stimulation to activity of malignant disease by endolaryngeal manipulations has been repeatedly noted. Here it was repeatedly marked. We should always be prepared for this event and if possible have the full consent of the patient to resort to whatever further operative procedures may seem advisable.

(2.) The testimony of the microscope is not to be depended upon unless the whole thickness of suspected tissue at several points can be secured. Numerous cases are on record in which the microscope has antagonised the clinical history, and others in which a microscopic diagnosis has not been verified. It is seldom possible to obtain a satisfactory microscopic specimen by means of forceps passed through the mouth.

(3.) The question of transformation of a benign growth into one of malignant character has apparently been decided by statistics in the negative, yet the fact remains that in this instance the appearance and history of the lesion continued absolutely benign for more than two years. In many cases a much longer period of quiescence has been observed. There was nothing whatever in the course of the disease to justify a suspicion of malignancy until after the use of the snare. It is not supposed that the latter did more than excite the virulence of the morbid process.

(4.) We are still in the dark as to positive signs by which to identify malignancy at its inception. Was this growth benign at the outset, and if so when did the malignant change occur?

At present the only way in some cases in which to determine the character of a doubtful laryngeal lesion is by its complete exposure through an external wound, and even then, in the words of Butlin: "It may be difficult to say what the nature of the disease is."

The picture in the laryngeal mirror is often indecisive as to the character of a lesion and mi leading as to its extent. Almost always in splitting the larynx we find much more territory involved than was previously suspected. The prognosis in *intrinsic* cancer of the larynx is perhaps more favorable than that of malignant disease in almost any other region of the body, yet our guiding principle here as elsewhere should be early operation to include by a wide margin every vestige of morbid tissue

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XXV.

MALIGNANT GROWTHS AT THE BASE OF THE TONGUE.

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CHILDREN.

To those of us interested in pathology it has no doubt seemed strange that "Waldeyer's Ring," should be singularly free from the formation of malignant growths. Especially is this true of sarcoma. In medical literature very few cases of this form of tumor affecting the tonsillar tissue have been reported. I have never seen a case clinically, but have had an opportunity of making a histologic examination of a sarcoma of the lingual tonsil which was referred to me by Dr. John R. Winslow in whose practice the case occurred. The notes of the case were also furnished me by him. The patient was a male of advanced years who had a large swelling at the base of the tongue. The tumor was hard and non-movable. There was no ulceration. Removal was successful with the cold snare. Hemorrhage was slight. The tissue removed was somewhat larger than a pigeon egg. Evidently the greater part if not all of the tumor was removed. After hardening in alcohol sections were cut and stained in hematoxylon and eosin. The histologic formation of the growth follows.

Under the low power the tumor is seen to consist almost entirely of cells. In certain areas connective tissue bands are evident. There is a decided infiltration of the surrounding normal tissues with cells but the neoplasm is fairly well circumscribed.

With the high power the cellular mass is much more prominent. Some of the cells are as small as small lymphocytes while others are large in size. The shape of the cells varies slightly from the round to the ovoid. No spindle cells are detected in the tumor. Some of the cells are multinuclear, while most of them possess a single, distinct nucleus. The protoplasm does not stain as deeply with the hematoxylon as the nuclei. The connective tissue is present only in certain areas. It consists of wavy fibres rather thin. Blood vessels are rather numerous. Some are large while the majority are small in calibre. The smaller vessels are probably newly formed in the tumor mass. The walls of the blood vessels are normal in thickness and are lined with flat endothelium. The tumor may be described as a round cell sarcoma consisting of small and large cells.

The growths most likely to be confounded with sarcoma in this location are tuberculoma and syphiloma. If the tumor is non-ulcerating, epithelioma can almost certainly be eliminated. The presence of giant and epithelioid cells along with tubercles and possibly tubercle bacilli are characteristic of tuberculosis. In gumma, the diagnosis can nearly always be made from the changes in the vessel walls, especially the arteries. These show a decided thickening from endarteritis. In the section above described there were no changes in the vessel walls.

The second tumor was observed in a man of 57 years. Six months before he came to the hospital for treatment he was annoyed by the sensation of a foreign body in his throat whenever he swallowed. He consulted a physician at once and was told by him after an examination of the throat that he had a small tumor at the base of the tongue. He was given potassium iodid in increasing doses, but the swelling continued to grow. At the time of his entrance into the hospital he was suffering great pain which radiated into both ears. There was no difficulty in talking, but the throat was filled with a thick, tenacious mucus which was very hard to expel. The anterior, cervical glands were enlarged but not painful. No history of syphilis could be obtained. The examination of the throat showed a large swelling at the base of the tongue, which obliterated all traces of the lingual tonsil. The outer surface of this tumor was deeply ulcerated, which gave the tongue the appearance of a cauliflower. The ulcer was covered by a grayish exudate, which, when wiped away, revealed a sloughing base. The odor from the growth was very offensive.

Feeling satisfied from the history of the case and the appearance of the growth that it was malignant and probably epitheliomatous, I removed a small piece for microscopic examination. The patient was given palliative treatment until the diagnosis could be made with certainty. The examination of the section the following day resulted in the positive diagnosis of epithelioma. The outer surface of the section was covered with squamous epithelium. Extending down from this were processes of irregularly shaped epithelial cells. These processes were of different shapes and different lengths, some large others small. At certain points there was entire cutting off of the epithelial processes from the main mass, giving rise to islands of cells at these points. In some of these collections of cells were to be seen the so-called nests which are characteristic of this form of tumor. These nests in a modified degree are sometimes seen in normal epithelium or in benign papillomata, but they differ very materially from the true epitheliomatous nests and to the experienced eye there is no difficulty in distinguishing between the two conditions. The entire section contained these collections of epithelial cells.

The clinical diagnosis was confirmed by the microscope. Since at the time o the examination there was no involvement of the epiglottis or of the walls of the pharynx, the tumor must be considered a primary epithelioma of the base of the tongue or of the lingual tonsil. No operation was advised on account of the extreme weakness of the patient and because of the extent of the glandular involvement. At a later stage of the disease the epiglottis and the walls of the pharynx became involved and the patient died three months later, just nine months from the beginning of his symptoms.

This case is offered for publication for two reasons. In the first place primary epithelioma of the base of the tongue is very rare. Butlin, in the collection of 80 cases of carcinoma of the tongue, found only one at the base. In the second place it emphasizes the great importance of an early diagnosis in such cases. This can be done only with the help of a careful microscopic examination. In this case, if the histologic examination had been resorted to instead of saturating the patient with potassium iodid when it was evident that the drug was doing no good, it is highly probable that the disease could have been completely eradicated or the patient's life prolonged. Had the patient fallen into the hands of a physician who appreciates the value of the microscope and its limitations, the result would have been different. I have no hesitation in saying that the microscope is a powerful means of diagnosis in these doubtful cases and should be resorted to in the beginning of the disease. Any physician who does not observe this rule has not done his full duty to his patient.

The extreme rarity of sarcoma of the tongue justifies the report of the first case. In the literature I have found only 25 cases recorded and some of these were probably not sarcomata. Five of these are described as having been located at the base of the tongue. All of these were of the round cell form or lymphosarcomata. The prognosis is not so unfavorable if the growth can be removed in the beginning. In the five cases recorded in the literature, to which must be added a sixth by Prota, there were four recoveries following operation and two deaths. Prota's case was a fibrosarcoma. The ages of the patients ranged from 19 to 56 years.

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XXVI

CONCERNING THE SINUS FRONTALES IN MAN WITH OBSERVATIONS UPON THEM IN SOME OTHER MAMMALIAN SKULLS.*

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A review of the literature suggests the necessity of a more complete description of the sinus frontales with some revision of the nomenclature according to their developmental characteristics, as well as a complete study of their architecture. The writer accordingly took Dr. Flint's suggestion to make a series of metallic injections of these cavities in order to reveal in positive form the normal negative outlines of the sinuses. Since students rarely obtain a stereoscopic concept of the pneumatic spaces contributing so markedly to the shape of the human cranium, an employment of the method by classes engaged in routine dissections is urged. In this laboratory it is found that students gain a much clearer idea of the cavities when they are studied by means of lead casts.

As will be seen by reference to the illustrations, two kinds of technique were utilized in gathering data for this paper, namely, chiselling and casting. The chisel calls for time and some delicacy of manipulation to get good results, but casting is simple, rapid, and seems by far the best method, inasmuch as the lead mold positively expresses the negative sinus. Following is an outline of the casting method:

When students have completed the dissections of the external face and cranium, a sagittal section of the head is made corresponding to the median line. While one or the other sinus frequently overlaps the median plane, the septum between them is commonly complete; accordingly it occasionally happens that the sections open only one sinus, and a pour-hole into the other must be provided by drilling through the intact septum. To prevent the metal escaping from the sinus by way of the infundibulum ethmoidale, the hiatus semilunaris is exposed and plugged with moist clay. In a melting pot over a circular gas burner, lead is raised to a temperature of brisk oxidation, as metal of a lower temperature often solidifies before reaching the utmost limits of the cavity. With these precautions the metal is directed into the sinus with a pouring ladle. It must, however, be poured slowly and in a thin stream, for should it enter rapidly and in a large mass, air is often retained in the sinus in quantities sufficient to ruin the cast. After allowing the lead to cool thoroughly the material is returned to the student for further dissection. Under the supervision of an instructor, he carefully removes the molds. They are then marked with the body number, making it possible at any time to obtain collateral information concerning the individual by consulting the records in the preparation room. The casts have rough surfaces due to generation of gas by the melted lead coming in contact with organic tissue in the cavities. Furthermore, the metal contracts slightly while cooling, but in the main the molds approximate quite exactly the sinuses in which they are made.

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*From the Hearst Anatomical Laboratory of the University of California.

*Reprinted by courtesy of Johns Hospital Bulletin.

This study is based upon examination of twenty-one adult male subjects, in age ranging from twenty-five to sixty years. The molds of all the sinuses changed from their normal state by pathological processes were rejected.

The cavities are said to be generally smaller in the female than in the male. Owen* has observed that the sinuses of Europeans are larger than in some other tribes. He states that they are imperfectly developed among the native Australians, and in consequence this deficiency engenders a want of resonance to the voice. In opposition to this, Macalister states that the sinuses are very large in Australian crania,* and Hilton finds them quite extensive in the skull of an African aborigine.† The latter, however, made but a single observation, and it is possible, of course, that his specimen might have been an unusual one.

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*Owen Ours: Circle of Sciences, p. 167. Quoted by Humphry. A Treatise on the Human Skeleton, etc. G. M. Humphry. Macmillan & Co., London, 1858.

Sufficient attention has not been called either to the importance of symmetry in the architecture of living forms, to its significance, or to the means by which it becomes one of the most striking characteristics of all the higher forms of organic life. It is suggestive, however, that all structures in the body are at some period in the life-history of the organism either completely or partially symmetrical—that is to say, form either complete mirror changes of each other, or may be divided by a median plane into halves which are enanteomorphic. In this connection it is noteworthy, therefore, that the sinus frontales vary in respect to symmetry more than any other paired structures in the human body. This is noted not only with reference to the deflection of the septum sinuum frontalium but also in other characteristics of sinuses in the same skull.

The sinuses from two cavities in the os frontale are situated dorsad of the arcus superciliaris and cephalad of the orbita, displacing the spongy bone between the inner and outer tables. They communicate with the meatus nasi medius by means of an osseous tube, the infundibulum ethmoidale, and are lined with a continuation of the nasal mucous membrane. Their position divides them into two parts, the pars frontalis, the portion of the sinus in the squama, and the pars orbitalis, the portion in the pars orbitalis ossis frontalis. Both frontal parts are shown in Fig. 5 *P. F. D.* and *P. F. S.* The orbital parts are shown in the same figure, *P. O. D* and *P. O. S.* Between the partes frontales is a perforate or imperforate partition of bone. leaning to one side or the other, the septum sinuum frontalium (Fig. 5, *s. s. f.*). The

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*A Text Book of Human Anatomy, etc. A Macalister. P. Blakiston Son & Co.

†Hilton On the Cranium. p. 13. Quoted by Humphrey. A Treatise on the Human Skeleton, etc. G. M. Humphrey. Macmillan & Co., London, 1858.

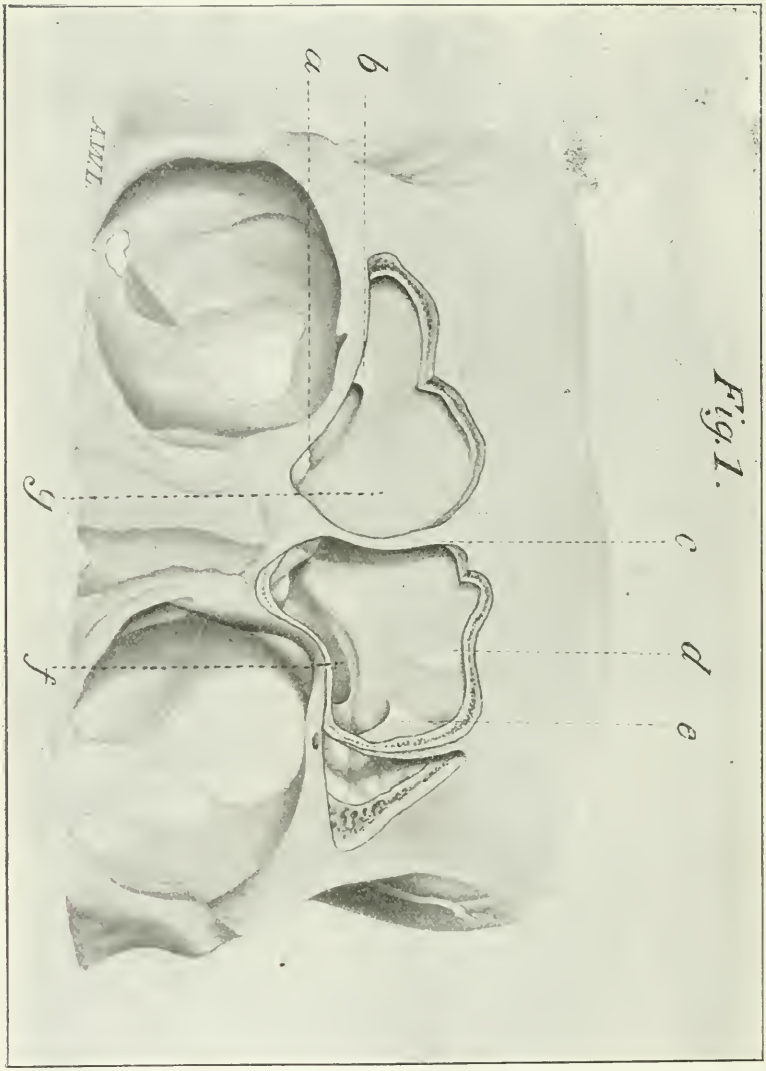

Figure 1.—Human Sinus Frontalis. In this case the arcus superciliaris on each side was equally developed, notwithstanding the difference in size of the sinuses. The median septum approximates the mid-line more clearly than is usually the case.

a—Summit of Bulla ethmoidalis dextra. Its fellow is opposite

occupying a slightly lower level.
b—Septum interpartes.
c—A strip of the outer table of the skull and a portion of diploe above the septum sinuum frontalium. The latter is intact and very thin. This septum more nearly approximates the median line than is usually the case.
d—Linear elevation of the dorsal wall indicating a poorly developed septum lateralis.
e—Septum lateralis.
f—Pars orbitalis sin.
g—Pars orbitalis dex.

frontal and orbital parts of the cavity are separated from each other in varying degrees by a partition of bone called the septum interpartes (5, *s. i. d.*). The cavities are also subdivided by bony trabeculae called septa laterales when in the pars frontalis (Fig. 5, *s. l. s.*), and septa dorsales when in the pars orbitalis (Fig. 5, *s. d. s.*). The lateral limits of the sinuses are ordinarily distant from each other about seven centimeters. They reach cephalad into the squama about three centimeters, and the diameter of a sinus from the most ventral point of the pars frontalis to the most dorsal one of the pars orbitalis is about two and a half centimeters. These figures of course represent the average of the twenty-one specimens used for this study. The pars frontalis of one sinus usually overlaps the median line and encroaches upon the territory of the other. This unequal development is responsible for the deflection of the septum sinuum frontalium. The two cavities always show a marked difference in outline and capacity, as is readily seen upon inspection of the casts represented in Fig. 5.

The sinus frontalis may be absent throughout life. This condition was found once in the skull of an old adult and the usual superciliary eminences were entirely wanting on both sides.* The extremes in size are pictured in Figs. 3 and 4, and 4, the former showing the largest, the latter the smallest casts in the series.

Contrary to the statement of Sappey,† examination of the

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*A series of sagittal sections found this os frontale of an unusual construction; it was thin throughout; the diploe included between the outer and inner tables was reduced to a thin line.

Traite d'Anatomie Descriptive, Ph. C. Sappey, Vol. 1, p. 264. Paris, 1888.

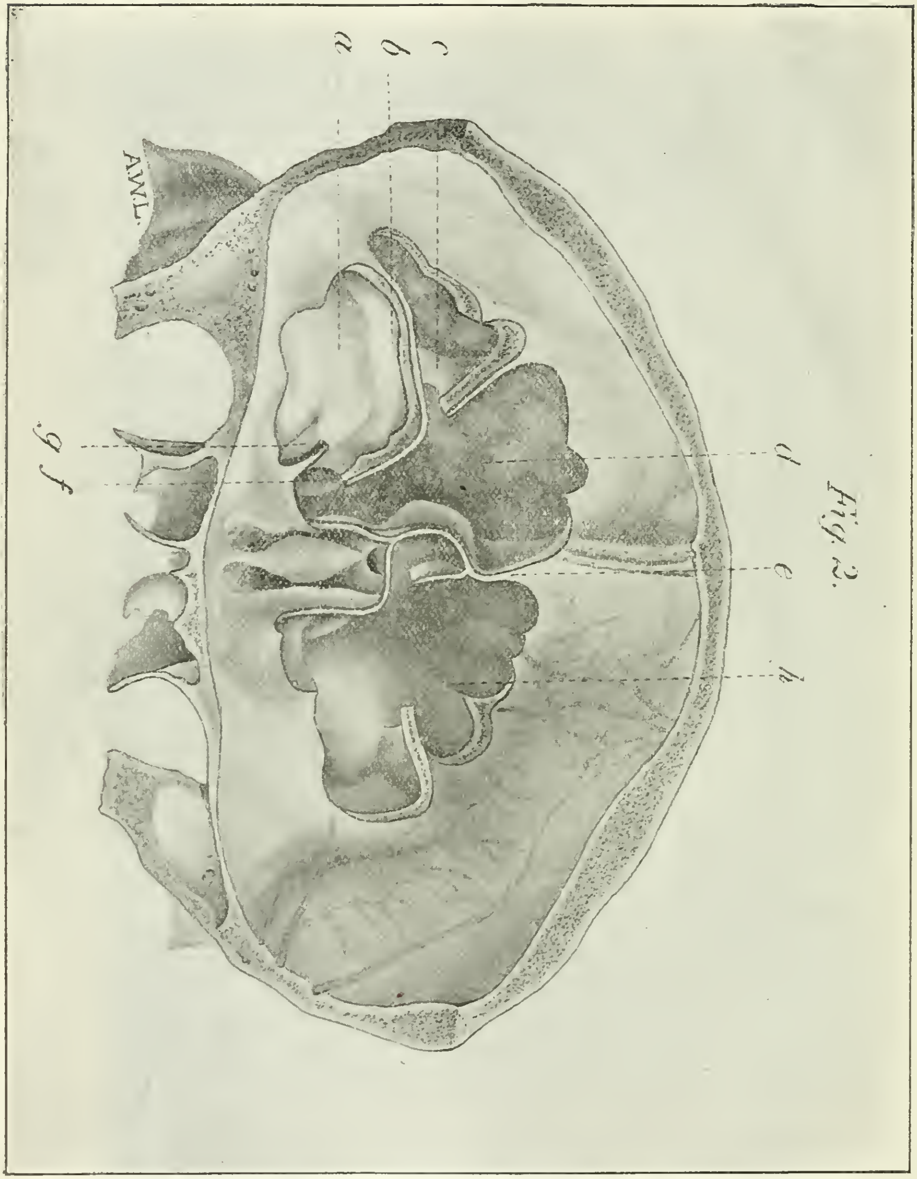

Figure 2.—Nearly all of the bone dorsad of the sinuses is removed. The left sinus is considerably the largest.

a—Pars orbitalis sin.

b—Long, tortuous and thin septum interpartes sin. Its fellow is more ventrally placed, is shorter, thicker and stands in one plane.

c—Septum lateralis sin.

d—Pars frontalis sin.

e—A strip of the inner table of the skull and a trace of diploe corresponding to the septum sinuum frontalium, although the latter is very thin. In this specimen the septum is intact and is in its characteristic, deflected position, but the median chamber of the right sinus has caused an unusual division of the septum, one arm being continuous with the medial walls of the cavities and the other arm ending by a free, caudal border in the pars frontalis dex.

f—Bulla ethmoidalis sin.

g—Septum dorsalis sin. It is longer and thinner than usual. Opposite is seen another septum dorsalis stretching between the dorsal and medial walls of the pars orbitalis dex. and has a free, falciform, cephalic border.

h—Linear elevation of ventral wall and is all that remains of a one-time septum lateralis.

arcus superciliaris develops no precise information concerning the size of the sinus beyond. The arcus may be larger or smaller than the sinus. In the majority of cases, it is quite true that a large superciliary prominence indicates a large cavity behind it and also the reverse, but the presence of an arcus is no guarantee of a sinus in the squama ossis frontalis. One old individual of the series possessed strongly fashioned eminences above the orbits, but had sinuses extending only into the orbital roofs. Casts of these appear in Fig. 4.

Between the sinuses is the septum sinuum frontalium. Proportionate to their extent into the squama. the septum is contracted in breadth and increased in length. It seldom approximates the median line, a fact due to the unequal size of the cavities. When the two sinuses communicate the septum may be perforated at any point in its extent. Usually, however, if not intact, the opening cuts through its caudal extremity. Out of twenty pairs the right sinus was largest in thirteen, the left one in three, and the remaining four were about equal.

Since in the process of their evolution the sinus frontales extend into both the squama and pars orbitalis ossis frontalis, it may be convenient to classify them according to their position; any pair may consist of partes orbitales, or partes

Fig. 3.

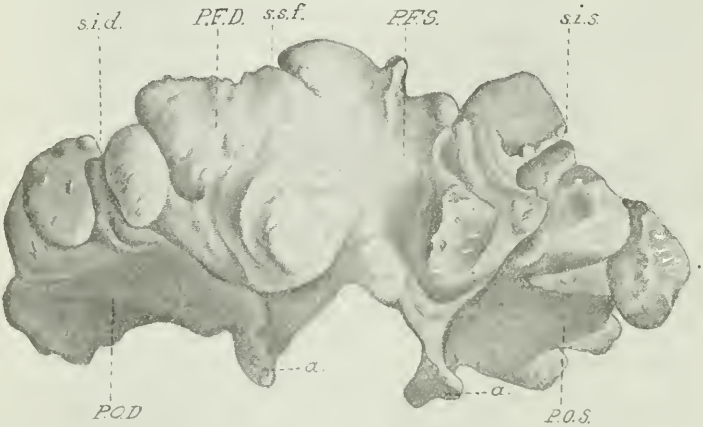

Fig. 4.

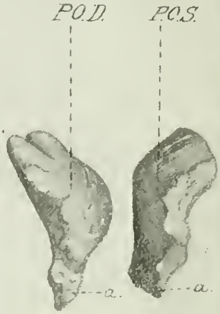

Fig. 5.

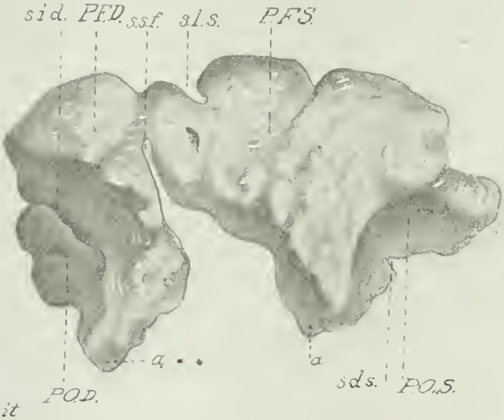

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Figure 3.—A Wood's metal cast of a large sinus (natural size).
P. O. D.—Pars Orbitalis Dex.
P. F. D.—Pars Frontalis Dex.
P. O. S.—Pars Orbitalis Sin.

P. F. S.—Pars Frontalis sin.
s. i. d.—Septum interpartes dex.
s. s. f.—Remains of septum sinuum frontalium.
s. i. s.—Septum interpartes sin.
a.—Metal prolongation into the cephalic end of the infundibulum ethmoidale.

Figure 4.—Lead casts of a small sinus and representing an instance where the sinuses were purely orbital in development (natural size).

P. O. D.—Pars Orbitalis Dex.
P. O. S.—Pars Orbitalis Sin.
a.—Metal prolongation into the cephalic end of the infundibulum ethmoidale.

frontale, but the latter condition is much more common. If the sinus of one side presents both parts well developed, its mate is usually approximately the same in form. However, when one sinus shows a capacious pars frontalis with only a slight orbital extension, the opposite cavity as a rule will be purely frontal in location.

The pars frontalis is, at times, no more than a slight, cephalic dilation of the infundibulum ethmoidale, reaching not further than the caudal level of the glabella (Fig. 8, *A*). While again it will be seen passing cephalad to the caudal circumference of the tuber frontale, stretching laterad to the linea temporalis, or even, according to Hajek,* excavating the processus zygomaticus and running dorsad to the sutura sphenofrontalis.

Out of nineteen cases where it appeared on both sides the pars frontalis was largest in thirteen. This frontal portion of the sinus (Fig. 1, *g*), whether large or small, is commonly a single chamber, but it consists frequently of a series of unequally-sized pockets, partially separated from each other by bony septa. These septa laterales (Fig. 1, *e*) are hung from the cephalic junction of the ventral and dorsal walls of the sinus and, before extending far into the sinus, often end in free, falciform borders. Occasionally they are so long that the several chambers are continuous with each other by very small openings. The septa, however, do not always span the intermural space but exist as low lineal elevations,

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*Nebenhölen der Nase. Hajek. Leipzig und Wien.

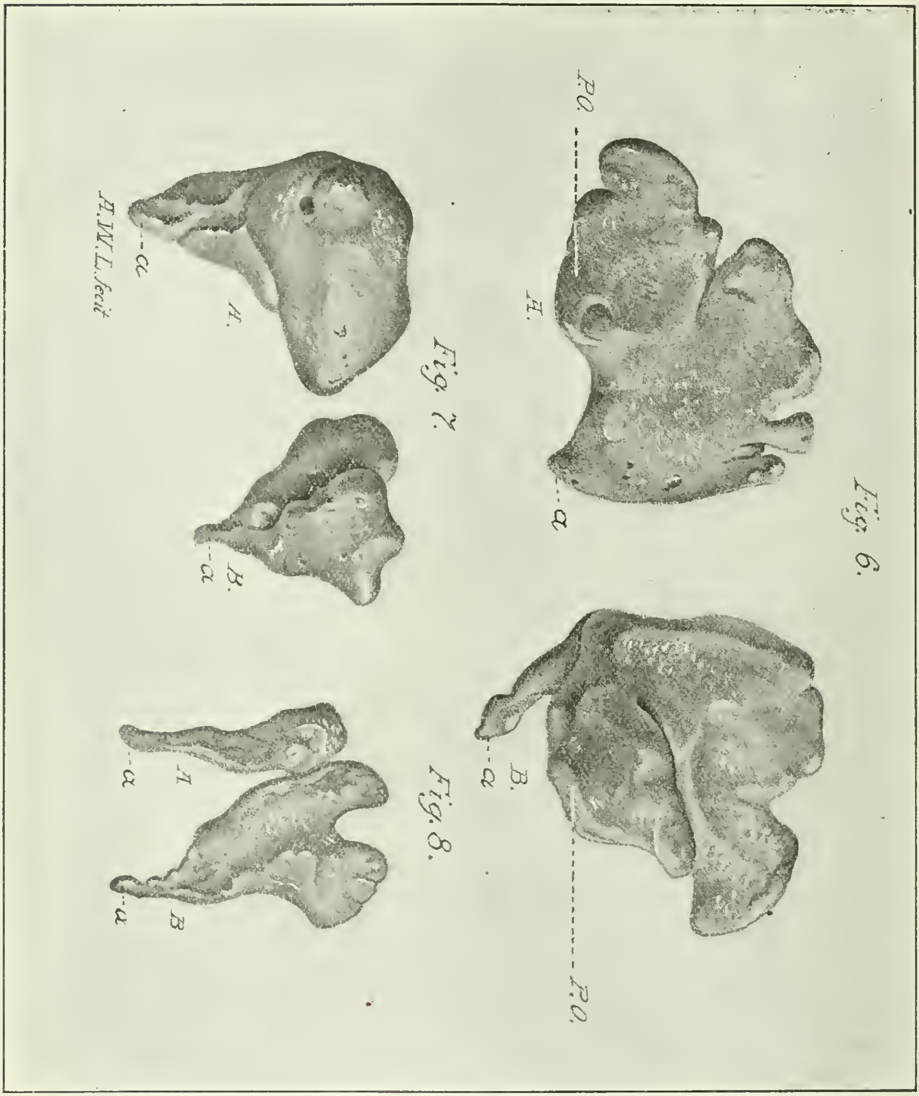

Figure 5.—Casts of an average pair of sinuses, showing a natural perforation of the septum sinuum frontalium (natural size).

P. O. D.—Pars Orbitalis Dex.

P. O. S.—Pars Orbitalis Sin.

P. F. S.—Pars Frontalis Sin.

s. i. d.—Septum interpartes dex.

s. s. f.—Septum sinuum frontalium.
s. l. s.—Septum lateralis sin.
s. d. s.—Septum dorsalis sin.
a. Metal prolongation into the cephalic end of the infundibulum ethmoidale.

Figure 6.—A and B are casts from different subjects (natural size), dorsal view. They illustrate the variation in position of the partes orbitales. P. O. of A. shows a left orbital extension proceeding from the lateral portion of the pars frontalis, while P. O. of B. is a pars orbitalis dex., resembling an outstretched wing, passing from the medial portión of the pars frontalis. A long septum interpartes partially separated the masses of the metal representing the two divisions of the sinus.

Figure 7.—A and B are casts from the left sinuses of different subjects (natural size), ventral view. A shows no lateral septum, while B, although a smaller sinus, is nearly bisected with an interval created by a long septum lateralis, indicating that these structures have no direct bearing on the size of the sinus.

Figure 8.—A and B are casts from a middle-aged adult (natural size), ventral view, showing one sinus as a simple dilation of the cephalic end of the infundibulum ethmoidale. The casts A and B are joined by a mass of metal filling an opening in the middle third of the septum sinuum frontalium.

in the majority of instances on the vent al wall (Fig. 2, *b*, and Fig. 1, *d*). It is the rule for the septa laterales to increase in number with an increase in the lateral extent of the sinus, but the amplitude of the latter, however, bears no definite relation to the presence of the septa. A large cavity may exist without them (Fig. 7, *A*), while a comparatively small one may possess a number. The capacity of a sinus, moreover, does not seem to influence the form of the septa. In a large cavity the one existing partition is often found so thin that light passes through it almost unobstructed, while those of a smaller sinus may be short and thick.

The type of sinus represented by the pars orbitalis alone often exists on one or both sides. This, however, is much less common than the purely frontal type, or a combination of the two. The pars orbitalis is represented at times by a simple, slight, dorsal extension of the pars frontalis, while at others it reaches out over almost the entire orbital roof. In the series, the pars orbitalis existed bilaterally in ten crania, where that of one side showed no marked size difference with its fellow. Out of twenty-six single sinuses, however, presenting a combination of orbital and frontal parts, the latter was most voluminous in twenty-two.

The pars orbitalis (Fig, 2. *d*) usually passes dorsad from the medial portion of the pars frontalis (Fig. 6, *B. P. O.*), nevertheless it might be an extension from the lateral part of the frontal division of the sinus (Fig. 6, *A. P. O.*). At times both parts communicate with each other very freely, but they usually are divided by a septum reaching medially from the lateral limit of the sinus. This septum interpartes (Fig. 2, *b*) may exist in one sinus and be absent on the opposite side, or as is usually the case, be present in both. In construction it often varies from a long, thin partition to a short, thick one. Like the frontal division, the pars orbitalis may consist of one or many chambers, but its pockets are seldom as large, since the septa forming them are, as a rule, rarely so deep as the septa laterales. The septa dorsales, subdividing the orbital portions of the sinus, are usually,

Fig. 9.

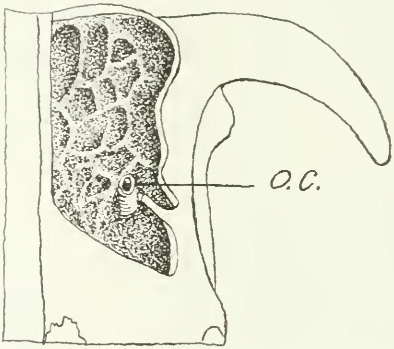

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Figure 9.—Detail of an illustration from Ellenberg and Baum, showing the immense sinus frontalis of the ox, which excavates the frontal, parietal and occipital bones, as well as the horn.

however, short and thick. Generally speaking, they arise from the lateral and dorsal limits of the pars orbitalis, although they may sometimes pass laterally from the median wall.

The sinus frontalis of the ox excavates the frontal, parietal and occipital bones, making a very large chamber between the inner and outer tables which may or may not communicate with its neighbor on the opposite side. The two tables of the cranium are not reinforced by complete bridges spanning the sinus, except around the peripheral portions of the cavity, where thick trabeculae divide it into small pockets, not comparable in size, however, to similar structures in the human skull. The sinus extends up into the horn which near its base is also trabeculated. Dorsad of the horn there is a system of trabeculae admirably situated for the reinforcement of this part of the skull against strains or shocks imparted through the horns. These also form with the outer table of the skull an eminence for the attachment of the large cervical muscles. That the presence of the sinus in this animal affords some protection against traumatism, is shown by a specimen with an extensively healed fracture of the outer table over the sinus, while the inner table remains intact. It does not seem possible to subdivide the sinus frontalis in the ox's skull into distinct portions, unless they are named arbitrarily from the bones or regions in which they occur.

The frontal sinus in the pig's skull (Fig. 10) excavates the frontal and a portion of the parietal bone. It does not however, extend into the occipital bone as is the case with the ox. This sinus is usually separated from its neighbor by a complete bony septum somewhat more regularly placed than the septum sinuum frontalium in the human cranium, although the partition in the pig may have usually a considerable lateral deflection. This sinus is often subdivided into a pars medialis and a pars lateralis by a septum interpartes which extends anteriorly to a greater or less extent. These two parts, however. do not correspond respectively to the pars frontalis and pars orbitalis of the sinus frontalis in the human cranium. The par medialis is included between the median and lateral partition and corresponds to the pars frontalis, while the pars lateralis is located between the orbit and the septum interpartes corresponding to the pars orbitalis of the human sinus frontalis. The two portions of the sinus communicate anteriorly. As in the human and other specimens, the sinus is subdivided around its periphery by a series of small trabeculae into small pockets. These, however, cannot lend a great deal of additional strength in re-

Fig. 10.

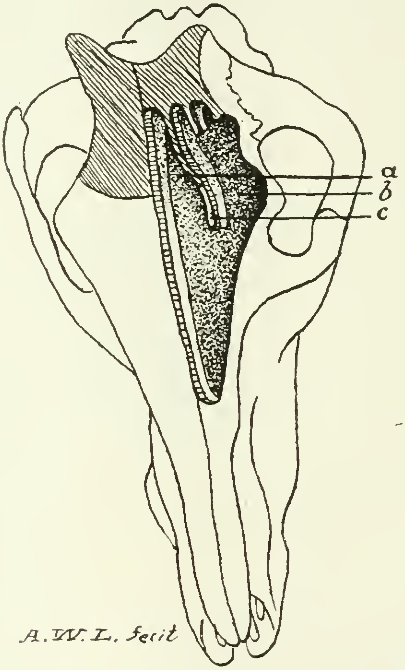

Figure 10.—A preparation of adult pig's skull viewed slightly perspective. The area shaded with diagonal lines represents a portion of bone removed to exhibit the sinus which excavates a position in the frontal and parietal bones. Here the cavity is differentiated into a pars medialis (*a*) and a pars lateralis (*b*) by a long septum interpartes (*c*).

inforcing the vault of the cranium, but the septum interpartes (Fig. 10, *c*) reaching from the outer to the inner table and extending forward through the broader part of the sinus contributes a great deal to its structural strength. The sinus frontalis in the sheep is limited to the ventral and lateral portions of the ossis frontalis. Its depth in the maximum is from 0.7 to 1.5 centimeters. Like the sinus in the pig's skull, it is subdivided into two portions by a septum interpartes

Fig. 11.

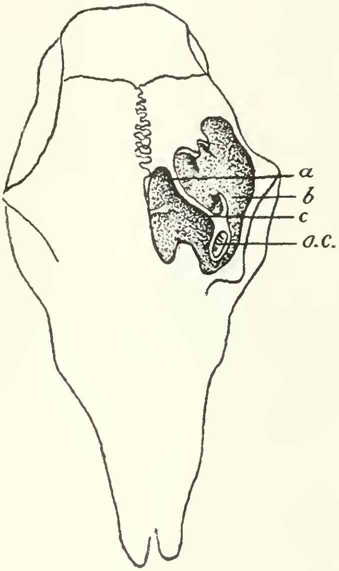

Figure 11.—A preparation of an adult sheep's skull, where the sinus frontalis is confined to the frontal bone.

a—Pars medialis.

b—Pars lateralis.

c—Septum interpartes.

The latter in this animal has the additional function of lending support to the osseous tube O. C., which transmits the superciliary vessels and nerve.

and the trabeculae around the periphery of the sinus are much more developed, exaggerating the sacculation of the sinus to even a greater degree than is shown in Fig 11.

In the dog the frontal sinus (Fig. 12) shows an irregularly spherical or ovoid cavity in the frontal bone, usually completely separated from its mate by the septum. No trabeculae bridging the tables are found in this skull and those around the periphery of the sinus are only developed to the extent of slight ridges, thus causing a slight sacculation of the periphery of the sinus. In the skull of the cat (Fig. 13)

Fig. 12.

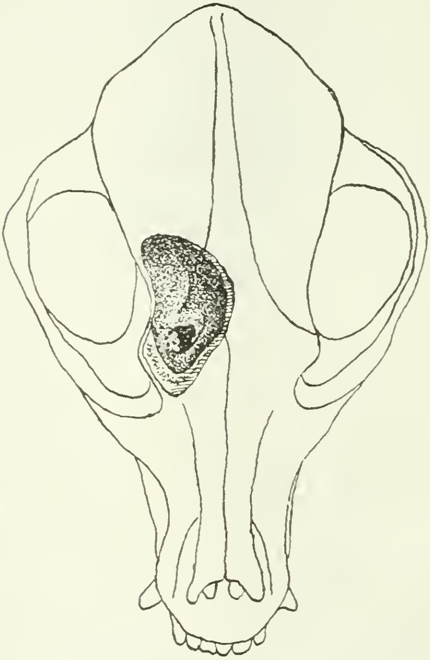

Figure 12.—A preparation of an adult male dog's skull, and shows the sinus entirely within the frontal bone.

the sinuses are limited to the frontal bone and are completely separated from each other by the septum sinuum frontalium. This cavity can often be divided into the pars frontalis and the pars orbitalis by a septum interpartes, the orbital portion extending lateralward out into the orbital process of the frontal bone. With the exception of this septum, there are no trabeculae save those indicated by mere ridges to interrupt further the regular outline of the sinus. In monkeys there

Fig. 13.

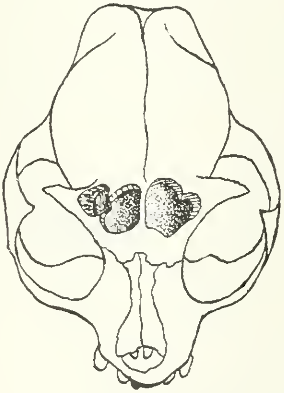

Figure 13.—A preparation of an adult female cat's skull with the sinuses situated in the frontal bones.

s no sinus frontalis present, notwithstanding the well-developed arcus superciliaris. There are, however, a large number of dilated bony cells which occupy a similar position to the sinus frontalis as it is found in the other animals. These rarefied bone cells take the place of the sinus and probably communicate with eachother and the nasal meatus, although injections to prove this point were not made. In horned animals trabeculae are arranged so as to provide not only for the strength of the sinus and the protection of the cerebrum, but also as a reinforcement against stress applied to the skull through the horns. No gradual increase or decrease in complexity can be followed through the animal series, the sinus seeming to adapt itself in each species toward the architecture of the skull to the end that it affords at the same time lightness and strength.

It has been suggested that the frontal sinuses are being eliminated from the vertebrate skeleton by a process of evolution, owing to their occasional absence in otherwise normal human crania, their irregularity in form, extent and capacity, as well as their extreme asymmetry. But a comparison of the sinuses in a series of mammals shows no diminution in their size corresponding to the position of the species in the animal scale. Moreover, the extreme modification presented by the sinuses in monkeys also seems to argue against the plausibility of the suggestion.

Fig. 14.

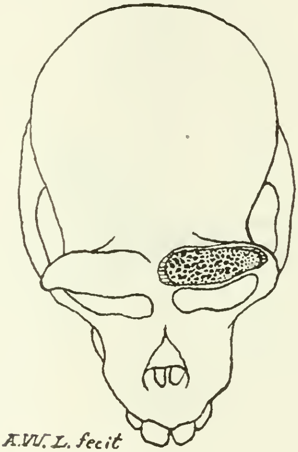

Figure 14.—A preparation of an adult male monkey's skull (species unknown). No sinus exists in the usual form. The arcus superciliaris sin. has been cut and shows the sinus, consisting of dilated pneumatic spaces.

Inspection of a comparative table of the relation of brain weight to body weight in the series of mammals compiled by Leurent and Gretiolet reveals the following facts:

For example, in the horse and pig the ratio of brain weight to body weight is respectively 1 to 582 and 1 to 481, that is to say, the proportion is much smaller in the pig than in the horse and yet the former has the largest frontal sinus. It appears from these two instances, which can also be amplified by others in the table, that there is no distinct relation between brain weight in its relation to body weight and the sinus frontalis. This also appears to be the case in reference to the relation between the cranial capacity and the size of skull, for monkeys. which next to man have the highest relative cranial capacity, possess only a modified frontal sinus, as the tissue beneath the well-developed superciliary arches consists simply of dilated pneumatic cells.

XXVII.

NASAL HYDRORRHEA.*

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A considerable literature on this affection has collected since Bosworth called the attention of the profession to it, in a thorough discussion of the subject, and I, in 1889, gave abstracts of the sixteen cases he then found on record. Little has been added to our knowledge since that time, although a number of theories as to its etiology have been offered by different writers.

It seems desirable to establish the entity of cerebro-spinal rhinorrhea. The character of the fluid, alone, would be sufficient to determine such an entity, and to distinguish it from true nasal hydrorrhea. The laboratory tests, as outlined by St. Clair Thomson, are sufficient to determine whether the fluid is cerebro-spinal:

1. Cerebro-spinal fluid is transparent, like water, and has no sediment.
2. It is faintly alkaline, and it may be either tasteless or slightly salty.
3. The specific gravity is 1005 to 1010.
4. It is not viscous and gives no precipitate, (mucin) on addition of acetic acid.

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*Read at the meeting of the American Laryngological Association. Atlantic City, N. J., June, 1904.

5. On boiling there is no more than a trace of coagulum of serum globulin or serum albumin.

6. Cold nitric acid gives a precipitate, which disappears on heating and separates on cooling.

7. Saturation with magnesium sulphate should give a precipitate; saturation with sodium chloride should give a precipitate, and ammonium sulphate should be tried if the above fail.

8. The liquid should give a pink, or rose red color, on addition of copper sulphate and excess of caustic potash.

9. It should reduce Fehling's solution.

10. The reducing substances can be separated out by evaporating to dryness an alcoholic extract of the fluid. It is then found as needle-like crystals.

11. An aqueous solution of the residue does not ferment with yeast.

It is generally conceded that this fluid comes from the subarachnoid space and finds its exit through the nasal cavities. Possibly it filters down through the perineural sheaths, or through traumatic openings in the skull, the results of blows, injuries, etc.

Hektoen records a case in which a portion of a meningocele was removed from the nose and cerebral fluid escaped therefrom.

It differs from true nasal hydrorrhea in some of the symptoms, particularly headache, which usually ceases when the discharge is free. Other symptoms, that might be referred to brain pressure, seem to result from the cessation of the nasal flow.

For these reasons the two affections should no longer be classified together, but should be considered as quite distinct in character.

Nasal hydrorrhea is a copious flow of watery fluid from the nasal mucous membrane, either continuing through the entire 24 hours or appearing at certain times during the day, or at irregular intervals, and persisting, sometimes, for long periods of time, possibly unaffected by any treatment whatsoever. It may come from both nares, but is often one sided.

The etiology of the disease has been the subject of much discussion and there have been various theories advanced. Its neurotic character is generally accepted. The two theories that have received the widest recognition are:

1. It is a neurosis of the tri-facial nerve in the nasal mucosa.

2. It is one of the symptoms of a general neurasthenic condition.

Bosworth believes that there are two classes of cases, in one of which there is an abolition of the function of the tri-facial nerve, followed by a serous exosmosis which takes place without sensation. In a second class of cases, there is an intense irritation of the nasal mucous membrane. Here the integrity of the tri-facial nerve is intact, and there seems to be some disturbance in the sympathetic system, to account for the phenomena. The latter class of cases, he thinks, is closely allied to hay fever, being dependent, largely, upon the neurotic habit, so-called, but differing from hay fever in the absence of a diseased condition of the Schneiderian membrane and the recognized influence of pollen upon it in hay fever. He summarizes his theories, tersely, as follows: "In connection with an intensely neurotic temperament the nasal mucous membrane is rendered sensitive to some obscure atmospheric condition, under the action of which vaso-motor control of the blood vessels, whose specific function is the exosmosis of serum in the normal process of respiration, becomes paralyzed, and then exosmosis takes place to an abnormally large extent."

Kyle, in his study of the subject, contends that in most, if not all cases, the hydrorrhea is a local manifestation of a constitutional condition in which the venous return is impeded, producing a cyanotic condition of the nasal mucous membrane, followed by a leakage of serum into the perivascular spaces, edema, hydropic degeneration of the epithelial cells, etc.

Nikitin considers it a reflex paresis of the vaso-motor nerves of the nasal mucosa, reflex in character, as might be caused by the presence of adenoids, etc., and illustrative of his theory, gives a history of such a case in a girl of eleven years of age, in whom the hydrorrhea followed the removal of lymphoid tissue in the pharyngeal vault, and which was cured after five months' treatment.

Cathcart reports a case, however, in a girl of nine, in which operation upon the adenoids, twice, and cauterization of the nasal cavities failed to give the slightest relief.

Lawrence had a case, following an attack of edema of renal origin, the flow existing for several years, finally becoming constant, and in which many forms of local treatment were without avail.

Angieras narrates a case following an operation on the sinus maxillaris for empyema, and in which the nares were normal. He thought the condition parotidean in origin.

Molinie cites a unique case in which the development came after an attack of ordinary "grippe" in which the grayish secretion changed to a blue color four or five times during the day. This could not be accounted for. Bacterial examination was negative. It was not hysterical and the color was not introduced from without.

Natier maintains that nasal hydrorrhea is invariably dependent upon a state of general neurasthenia and is exclusively a symptom of that affection, and, in support of his theory, reports 14 cases with a neurasthenic history. He considers that nasal polypi and other intra-nasal pathologic conditions are the effects and not the causes of hydrorrhea, thus accepting an assertion previously made by other observers. He believes the frontal sinus plays an important part in the formation of the liquid, thus accounting for the frontal headaches which some others consider simply plethoric in origin. He also believes that cerebro-spinal rhinorrhea could be proven to be neurasthenic. The hydrorrhea caused by hay fever he thinks entirely distinct, being a special vaso-motor rhinitis.

Mayer reports 5 cases, in 4 of which, just preceding the menopause, the nasal hydrorrhea was much augmented during the menstrual period. These cases were all cured.

In this connection a case reported by Laguerriere, last year, is interesting. A woman, 30 years of age, was being treated for pelvic trouble, by means of electricity, and thus was relieved of an obstinate and profuse nasal hydrorrhea.

Litchwitz had a case, in a woman, associated with various nervous phenomena, which was improved by puncture of the right sinus frontalis, and a year later cure followed the expulsion from the nasal cavity, of a gelatinous mass.

Lermoyez thinks that the disease is much more frequent than his American confreres have believed it to be, and that it is a common ailment among the sufferers from arthritic conditions, of which it is merely an accidental symptom, often alternating with other phenomena of that state, as gout, rheumatism, migraine, etc. Nasal lesions are not constant and are possibly secondary. He further asserts that the fluid is not an exosmosis, but a true secretion, dependent upon abnormal excitation of the trigeminal nerve, and cites as proof that muscarin intoxication produces nasal hydrorrhea. He asserts that there may be vaso-dilator activity but not paralytic phenomena. Pathogenically, the relation between the nasal hydrorrhea and the general systemic condition, and its relation to local or nasal lesions should be carefully studied.

One of the most critical of recent investigators, St. Clair Thomson, in his classical paper on the subject, in 1898, has limited the term "nasal hydrorrhea" to those cases in which no visible pathological changes are found in the nares, and in which the fluid flows from the mucous membrane, without any apparent cause of irritation, in the nose or neighboring parts, and in which the amount of secretion is considerable. He furthermore takes as a standard of the character of the secretion Prof. Halliburton's analysis in his case. This showed:

Water	98.792	Per 100.
Total Solids	1.208	
Proteids, including the mucin	0.260	
Other organic substances	0.163	
Inorganic substances	0.785	

He says that the presence of mucin, the absence of reducing substances, as well as the percentage of proteids and solids differentiate it from cerebro-spinal fluid. He insists that we should eliminate from consideration, in our study of true nasal hydrorrhea, cerebro-spinal rhinorrhea, those cases dependent upon pathologic intra-nasal lesions; those caused by sinus disease or by general nervous affections and those in which there is not a copious flow, being simply a symptom of such conditions as hay fever, vaso-motor rhinitis, etc.

These are the main theories advanced by investigators. To me, it seems that the neurasthenic character of the disease is fairly well established, and probably the exosmosis of the fluid is due to the irritation of the terminal filiments, in the nasal mucosa, of the tri-facial nerve. The exciting cause is not well established, and is probably due, in many cases, as suggested by several authors, to some obscure atmospheric condition.

The main symptom is the discharge of a clear, limpid fluid from the nose, which examination should determine was not a true nasal secretion. It may be from both nostrils, but often from one only, the quantity varying widely in different cases, from a rather free discharge to a pint or more in 24 hours. The flow may come drop by drop, without intermission in the 24 hours, or may be somewhat periodical in character, possibly ceasing for a time but, in many cases, recurring.

There are other symptoms, as headache, insomnia, cough, sneezing, nervous phenomena, etc., which are by no means constant, but in many cases the discharge is practically the only pronounced symptom of which the patient complains. The nose, on examination, may appear perfectly normal. Kyle noticed a boggy appearance of the mucous membrane of the nasal cavities during the attack, in his case, and there was evidence of a passive congestion and local irritation.

In the treatment some results have been shown by a few, while many report the trial of numerous remedies with little or no influence on the course of the disease.

Linhart's case was cured by the use of Dobell's Solution with a dram of suprarenal extract to the ounce, used as a spray. Similar satisfactory results from suprarenal extract are recorded by Phillips and Berens, the latter using the remedy both locally and internally. Natier recommends a general treatment for the neurasthenic condition, believing local remedies of little avail. Mahu reports a case cured by the use of hot air. Baber used the constant current of electricity and a 20 per cent. solution of menthol as spray and reports his case cured after a few months treatment.

Lermoyez seems to have observed a larger number of cases than anyone else—42 in number. He deprecates any local treatment, whatever. In 15 of his cases, treated with the usual methods of endo-nasal manipulations, removal of polypi, etc., only two were cured. Of the remaining 27 cases 13 were lost sight of, but he believes some of them were improved. Of the remaining 14 cases, 10 were cured by the use of strychnin and atropin as follows:

Sulphate of Strychnin	5	milligrams
" " Atropin	5	"
Syrup of Orange Peel	400	grammes.

2 drams of this mixture were taken at breakfast for 10 days; on the following 10 days, 2 doses daily; on the following 10 days, 3 doses, always at meal time. In this way he attacked the hypersecretion with the atropin and the vaso-dilatation with strychnin. He thinks this treatment should always be instituted at first and local treatment should be undertaken only when this had failed.

Other forms of treatment have been referred to by Bosworth, and other authors, among the most important of which are electricity, cauterization, cocain, quinin, etc.

Author's case: Mrs. G. M. F., aged 44, was brought to me, by her physician, Jan. 30, 1904, complaining of a constant dripping of fluid from the right naris, which began December 15th, and had continued, without intermission, since that date, day and night. She had a similar attack, following a cold, 5 years before this; one which lasted for ten days and yielded to local treatment. She was of a decidedly nervous temperament, the condition being much aggravated, at this time, from the persistency of the discharge. Her heredity was good and she had never had a severe illness. She was of robust appearance; and in every respect she was in excellent physical health. She had been under considerable physical and nervous pressure previous to the attack, having nursed a relative through an attack of typhoid fever in October, and was ill in November, and in bed a week, from a streptococcus infection of the throat, which was at first thought to be diphtheritic. Three weeks later she went to St. Paul, to be with a friend whose husband was to undergo a severe operation; she was present at the operation, lasting 1¾ hours, and, for two days and nights following, was sympathetically consoling the hysterical wife. She became much exhausted physically and nervously. She returned to Chicago, at once, and, on the way to the train, on a very cold day, was suddenly seized with a severe aching, burning and stinging sensation in the right side of the nose, accompanied with sneezing and the symptoms of an acute rhinitis. In three days the watery discharge began.

Status praesens: General health, good. Excellent appetite. Temperature, normal. Pulse, normal. She said she had no headache. The nasal discharge was painless and dripped from the right side, only, on an average of about four large drops a minute when the head was held forward. Her nights were much disturbed, for the secretion continued while she slept, soaking her pillow, and on change of position running into the pharynx and causing choking sensations when it reached the larynx. There was no excoriation of the lip. During the day she wore a napkin around the nose, and constant use of the handkerchief was necessary. The fluid did not stiffen the handkerchief. The nasal cavities were free. They were normal in every respect, save possibly an excessive moisture of the right side, but no site of the discharge of the fluid could be found and the mucous membrane had no swollen or sodden appearance. The throat was also normal. The fluid was examined at the Columbus Laboratory. It was clear, limpid, tasteless, but became clouded on standing; specific gravity 1012; alkaline, sugar absent, albumen absent, cells absent, mucin absent. It was declared purely a serous exudate. A quantity was collected for an hour, during the day, and it was found that 12 ounces were discharged in 24 hours. The patient stated that this was somewhat increased when she was very nervous.

Treatment: She was given a pill of zinc phospide, nux vomica and quinin, with benefit to her nervous condition and bromidia to quiet the restlessness at night. She had already had treatment at the hands of other physicians, by electricity, bromides, belladonna and varied local applications, without benefit. I used, at first, 5 per cent. protargol, then 50 per cent arygrol, to the nares, and gave her a spray of adrenals 1-5000 and Dobell's Solution to use at home. I tried, in succession, cocain, adrenalin, cauterization, zinc salts, strong applications of menthol in albolene, and internally, belladonna, aconitine, etc., without the slightest benefit. Finally, I used a solution of argentum nitrate in small quantity, 60 grains to the ounce, and over a portion only of the nasal cavity. This caused some pain and a little headache, but immediately following there was a cessation of the dripping for a few moments. On February 20th, I swabbed the the nasal cavity first with 1-1000 suprarenalin solution thoroughly, and applied the 60 grain solution of nitrate of silver to the entire accessible parts of the nasal cavity The pain was severe and she went home and went to bed with a violent headache, caused by the treatment. On February 25th, the headache ceased, the discharge began to decrease rapidly, and in three or four days ceased entirely, and has not returned.

In this case, it seems to me, we have a true nasal hydrorrhea. The character of the fluid differentiates it from cerebro-spinal rhinorrhea, and headache was not present. Thomson gives as among the evidences of the discharge being cerebro-spinal, that it is usually one sided, continues during the whole 24 hours, does not stiffen the handkerchief, and the nose presents no pathologic changes. Notwithstanding the presence of these conditions, in my case, the inception of the disease, with intense nasal irritation, with the general nervous symptoms and absence of any symptomatic evidence of the fluid coming from without the nasal cavity, I am satisfied that there was first a marked irritation of the terminal fibres of the vaso-motor nerves in the nasal mucosa, followed by paresis, and an exosmosis of fluid through such loss of nervous control.

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BIBLIOGRAPHY.

Bosworth.—Diseases of the Chest, Throat and Nose, 1889, Vol. 1, p. 258.

Kyle.—Journal American Medical Association, 1896. XXVI, p. 697.

The cases reported up to 1896 will be found in the two references above.

Lichtwitz, L.—Prager Medicinische Wochenschrift, Prague, 1893, XVIII, 71, 82, 94.

Jankelvitch.—Revue Hebd. de Laryngologie, Paris, 1897. XVII, p. 1505.

Holinger, J.—Chicago Medical Recorder, 1895. XIV, 433-35.

Coolidge, A.—Boston Medical and Surgical Journal, 1898. CXXXLX, 490.

Molinie, J.—Journal American Medical Association, XXXVI, p. 1818.

Chappell, W.F. —New York Medical Journal, IX, p. 403.

Thomson, St. Clair.—Trans. Medico Chirurgical Society, London, 1898.

LXXXII.—British Medical Journal, 1898, 11, p. 1247.

British Medical Journal, 1899, 11, p. 793.

Nikitin, W.—Monatschrift für Ohrenheilkunde, Berlin, 1898. XXXII, p. 553.

Molinie, J.—Revue Hebd. de Laryngologie, Paris, 1898. XVIII, 1308-12.

Baber, C.—Journal of Laryngology, Rhinology and Otology, March, 1898.

Melzi, W.—Journal of Laryngology, Rhinology and Otology, 1899, XIV, 63.

Lermoyez.—Presse Medicale, May, 1899, No. 41, p. 203.

Annales des Maladies de l'Oreille, etc., Paris, July 1899.

Abstracted in Journal Laryngology. Rhinology and Otology August, 1900.

Brown, J. H.—Medicine, 1900, VI, 993.

Freudenthal, W.—New York Medical Journal, March 31, 1900.

Linhart, C. P.—Annals of Otology, Rhinology and Laryngology, August, 1900.

Berens, B.—Annals of Otology, Rhinology and Laryngology, August 1900.

Williams and Stocker.—British Medical Journal, 1901, 11, 1042.

Angieras.—Revue Hebd. de Laryngologie, Paris, June 29, 1901, p. 753.

Natier, Marcel.—Abstract New Orleans Medical and Surgical Journal, Aug., 1901, 110.

Mahu, G.—Annales des Maladies du Larynx, du Nez, etc., No. 6, June, 1902, p. 481.

Lawrence, L. A.—Transactions London Laryngological Society, Jan. 10, 1902. Also Journal Laryngology, Rhinology and Otology. April, 1902, p. 198.

Catchart, G. C —Transactions London Laryngological Society, March 7th, 1902. Also Journal Laryngology, Rhinology and Otology, May, 1902, p. 255.

Larkin, F. C.—Liverpool Medico Chirurgical Journal, October, 1902.

Laguierriere, A.—Le Progres Medicale, 1903, Jan. 10.

Garaizabel, I.—Revisita Centro Med. de Cordoba, Argentina, 11, 6-7.

Jankelvitch.—Revue Internat. de Rhin. Otol. et Laryngol. Paris, 1898, IX. 5-13.

XXVIII.

THE PATHOLOGIC AND PATHOLOGICO-ANATOMIC INVESTIGATION OF THE DISEASED MIDDLE EAR DURING THE LAST DECADE, AND THE CHANGE IN OUR VIEWS OF ITS THERAPY CAUSED THEREBY.

By Dr. K. Grunert.

HALLE A. S.

Translated By Clarence Loeb, A. M., M. D.
ST LOUIS, MO.

While I was busy during the last decade with the preparation of the Year Book on the Middle Ear as a part of the large work of Lubarsch and Ostertag (Ergebnisse der allgemeinen Pathologie and pathologischen Anatomie der Menschen und der Thiere, J. F. Bergmann, Wiesbaden); I kept in mind the thought of collecting from the Year Book the most important facts, and of putting them together in a readable form for our circle of readers, in order to acquire thereby a review of the most important advances in the pathologic anatomy of the middle ear during the last decade. Inasmuch as it is the object of this journal to serve the interests of theoretical as well as of practical otology, it was necessary in places to draw practical conclusions from theoretical findings; in other words, to see how far theoretical results could be made practicable, and also to settle the question as to what changes they necessitated in our therapy.

Although theoretical investigation and practice must go hand in hand and the latter must follow the former, this following must be no blind one, but rather one of careful testing and judgment. We must always bear in mind that our theoretical views often undergo daily variation. It would hardly be proper for the practicing physician to be always prepared to draw the therapeutical sequence blindly from such changeable theoretical views. As much as life advances in theoretical investigations, ·just so critically scrutinizing must be the advance of the physician. Practice should always observe a healthy conservatism, which, in consequence of the constant relationship between theory and practice should hold it equally far from standing still as from too eager discarding of well tested remedies.

In last year's Congress at Karlsbad, I took occasion to show that our specialty had not always avoided this reef and the following arguments support the correctness of this statement.

GENERAL REMARKS.

An intelligent division of labor between otologists and bacteriologists together with the aid of pathologic anatomy, in investigating the relation of pathogenic microorganism to diseases of the middle ear has resulted during the last decade in determining the organisms that cause the inflammation in the ear, and those that are present only as a secondary infection. This was possible in spite of the difficulties of the technique, and in spite of the connection of the diseased middle ear with the external world by two canals, one of which, the Eustachian tube, cannot be closed against secondary infections.

As the foundation for the correct interpretation of the relation between microorganisms and diseases of the middle ear, it was first necessary to determine whether or not bacteria are ever present in the normal middle ear. This question was answered in the negative as far as dogs and rabbits were concerned by Lannois[1] in the year 1896, and by Preysing in 1899 in regard to men[2]. These investigations of Preysing have been lately confirmed by Hasslauer[3].

Although the cause of this immunity of the normal middle ear to bacteria has been regarded as due to a bactericidal property of its mucous membrane, it is rather the protection afforded by the movement of the cilia of the epithelium lining the Eustachian tube toward the pharynx, by means of which the ear is well able to protect itself against the invasion of bacteria from the nasopharynx. Every injury to the tubal epithelium leading to a retarding or cessation of the movements of the cilia, opens a passage way to the middle ear. With this in mind, we can understand the tendency of febrile infectious diseases to result in diseases of the ear, in so far as the ciliated epithelium of the tube is injured in its biological properties by the high fever itself, and the toxines of the disease. No special proof is needed, that the resistance which the tube normally affords to the passage of germs into the ear can be mechanically overcome, and thus artificial otitis can be formed. To this group belong the otitides that are caused by violently blowing the nose, and the forcible entrance of infected nasal secretion into the middle ear, and also those following the use of the nasal douche, most bath otitides, and those caused by the use of snuff.

Although all investigators are agreed that the usual gateway of infection of the middle ear is the Eustachian tube, it is probable on the other hand that certain forms of otitis owe their origin to a hematogenous infection. It is just the last decade that has enriched our knowledge of this phase.

Thus Barnick[4] claims that acute tuberculosis of the ear owes its origin almost exclusively to a great overflow of tubercle bacilli into the blood, which in numerous other organs causes a rapid developement of miliary tubercles. But he also claims a hematogenous infection is the cause in a small number of chronic aural tuberculoses especially in scrofulous children, in whom, following a rupture of a cheesy focus, poor in bacilli, the infection-carrier is distributed very sparcely. Whether the first seat of the specific infectious organism is in the mucous membrane lining the middle ear or the temporal spongiosa, can scarcely be proven with certainty in many cases, since the disease often passes immediately over from one tissue to the other.

Furthermore, Levin[5] has shown the probability that the majority of the cases of acute otitis, accompaning pharyngeal diphtheria and running the usual course of an otitis media, are the result of local manifestation of diphtherial poison circulating in the blood, and not of a propagation of the pharyngeal process to the middle ear by way of the tube.

We are of course at present unable to solve the question of the hematogenous infection of otitis complicating those infectious diseases whose specific germ we do not know, e. g., measles and scarlatina

In those malignant forms of scarlatinal otitis characterised by rapid destruction of tissue, in which Leutert[6] always found streptococci, only, in the diseased ear, the often simultaneous appearance of the disease in all parts of the ear (panotitis) speaks for a hematogenous infection of the ear. Although it has been known for some time that the streptococcus has great influence in bringing about scarlatinal otitis, Leutert thinks he has proven that this organism is specific for it. He says "that the streptococcus is the germ that gives to scarlatina the picture of a severe disease, while the so-called specific germ of scarlatina seems to have no relation to the severe general infection and suppuration."

The statement of Zeroni, that the infectious osteomyelitis accompanying otitis arises by way of hematogenous infection, is much less certain than the probability of a hematogenous infection as the cause of certain forms of inflammation of the ear in tuberculosis and pharyngeal diphtheria.

In opposition to the surgeons, who regard an osteomyelitis of the temporal bone as an everyday occurrence, we must insist that up to now not a single case is known in otologic litarature which proves beyond doubt the presence of osteomyelitis in the temporal bone. Even the important cases of Brieger[8] and Moure[9], where there was an empyema of the mastoid not preceded by an otitis media, allow the possibility that there was no true osteomyelitis but only a disease of the mastoid mucous membrane on a hematogenic basis.

A very remarkable case reported by Zeroni from the surgical clinic of the University of Halle(Geh.-Rat. v. Bramann) teaches how careful one must be with the diagnosis of osteomyelitis of the temporal bone even when there is a general osteomyelitis, and a diseased focus in the temporal bone without a previous inflammation of the middle ear.

It was the temporal bone of a 12 year old boy who had died of a general osteomyelitis.

The microscopic examination showed "all nutrient canals of the bone were normal and free from inflammatory signs. There was found, however, larger or smaller spaces in the bone of the superior meatal wall filled with leucocytes of widely varying sizes, and frequent variations in the shape of the nuclei. All of the spaces were lined with cubical epithelium which indeed was not present everywhere, but was at least demonstrable in some place in every space. The epithelium was likewise infiltrated with leucocytes, and the underlying connective tissue was greatly hypertrophied. Here also were found leucocytes, but only in layers lying immediately under the epithelium. Similar pictures were to be found at other places in the temporal bone, especially in the cells lying around the antrum, Only the cells of the tip were free and entirely normal. The mucous membrane of the middle ear also showed no inflammatory changes."

There was, then, in this case an inflammation of the temporal bone accompanying a severe infectious osteomyelitis, but "it was an inflammation of the mucous membrane lining the mastoid cells, which was independent of disease of the middle ear." Zeroni believes that it was a disease of the mucous membrane on the basis of a hematogenous infection; he justly remarks that if this disease had not been seen in a beginning stage, but later, when the inflammation had subsequently attacked the medullary spaces of the spongy bone and the Haversian canals, it would have been possible, considering the general cause, to regard a primary inflammation of the medullary spaces of the bone as the starting point of the process.

In regard to the individual microorganisms found in the middle ear, the reader of the numerous works that have appeared in the last decade will often find a contradiction in the finding of individual investigators. The explanation of this lies not in a failure of observation due to scanty bacteriologic training, nor in generalization based on conclusions drawn from insufficient material, but rather in the difficulty of bacteriologic investigation in this very locality. The difficulty of obtaining the material for examination, pure from the deep-lying middle ear, the connection of the foci of disease with the external world by two ways that cannot be closed against secondary infection, viz., the external meatus and the Eustachian tube, and the tendency of the inflamed middle ear to mixed infection, explained on these anatomic grounds, show why it is that one investigator considers one of the microorganisms found in the suppurating middle ear to be the specific germ, while another ascribes to it a secondary role.

It is certain that acute otitis media is especially a monobacterial disease, while a polybacterial fauna is always found in chronic suppuration.

If, in studying the relationship of the different organisms to the production of otitis media, we select the investigation of Leutert (l. c.) from the numerous works dealing with the subject, it is because his material for investigation seems to be the freeest from contamination. While the other investigators took their material, more or less pure, from the middle ear, and thus, by possible touching of the meatus, opened a way for a source of error in their experiments, Leutert took his direct and pure out of the collection of pus in the mastoid that he had just opened. In 63 mastoid abscesses following acute suppuration of the ear, he found streptococus 38 times in pure culture, pneumococcus 11 times in pure culture, staphylococcus 5 times in pure culture, pure tuberculosis 2 times, and in the other cases mixed infection, impurities, or doubtful results. The immense preponderance of streptococci in acute empyema, he ascribes to the freqency of streptococcus otitis, which Green[10] also showed lately in a collection of 73 cases, in which he examined the first drop of pus that followed a paracentesis. That Leutert observed the staphylococcus less frequently than the other authors, finds a very plausible explanation in the circumstance that their material often came in contact with the meatus.

In contrast to the relative malignancy of the streptococcus, which is manifested in the fact that intracranial complication lie especially in the domain of this microorganism, Leutert and the other investigators (Zaufal, Netter, Maggiora, Gradenigo, Vernieull, etc.) claim for the pneumococcus a relative non-malignancy in its character as a cause of otitis. He agrees with Maggiora and Gradenigo, who partially explain this lack of malignancy by the fact that the pneumococcus is always found in the aural pus in a state of weakened virulence, and he also found this same condition in the oral cavity, the original source of this infection. The preponderance of the pneumococcus in the empyemas located in the tip of the mastoid, as well as the rarity of pneumococcus infection in the young has so far not been explained.

Of great interest is the circumstance first noted by Zaufal but emphasized by Leutert, that the pneumococcus usually makes a distinct clinical picture in the otitis caused by it. According to Leutert, usually, though not invariably, the otitis caused by the pneumococcus is distinguished from that caused by the streptococcus by three points: (1) the acute processes in the middle ear pass away quicker in the pneumococcus form; (2) the pneumococcus has a greater tendency to spread beyond its original infected area, than the streptococcus (more frequently epidural abscess); (3) After cessation of the acute processses in the middle ear, the pneumococcus infection often remains for a time latent before it again becomes acute in the mastoid.

Leutert considers the importance of the staphylococcus in the etiology of acute mastoiditis as so minimal, that he even leaves the possibilty open that a secondary infection had already taken place in the few cases of acute empyema where the staphylococcus was present.

Other authors, such as Pes and Gradenigo[12], and later Green (l. c.), explain the chronicity of an acute otitis media on the ground of the individual anatomic conditions as well as pathologico-anatomical factors, a point of view which finds a certain support in the connection recently established by Roaldes[13] between certain anatomic conditions and predisposition to middle ear inflammation. Leutert, however, as well as some of his predecessors, considers the secondary infection with staphylococci, especially staphylococcus albus, and with saprophytes to be the chief cause of the chronicity of the middle ear suppuration. At any rate, according to him, these secondary invaders enter from the naso-pharynx through the Eustachian tube and not, as Lermoyez and Helme[14] claimed, through the perforated drum. Leutert did not assert this from a purely bacteriologic standpoint, but rather from a mixed one, since he recognized in the mentioned pathologico-anatomic factors an influence in bringing about the chronicity of the ear suppuration, insofar as they lengthenened the process of healing, and thus created favorable circumstances for the entrance and development of staphylococci and saprophytes.

Hasslaur (l. c.) thinks upon the basis of his investigations, that he could dispute the view of Leutert, that it was chiefly the secondary infection with staphylococci which brought about the chronicity of the suppuration, but does not present convincing proof.

Only the most important of the facts concerning the bacteriology of the diseased middle ear, that have been proven in the last decade, will be mentioned. Kossel[15] was the first to demonstrate the presence of Loeffler's diphtheria bacillus in the pus of an acute otitis media, in a child with diphtheria.

Stern[16] showed that the bacterium coli is found in a suppurating ear, while Leuter found it in an otogenic brain abscess. Zaufal[17] deserves the credit of first showing the pathogenicity of actinomyces in the middle ear; he thought that in his case (suppuration with granulations, in which the the mycelia were found) the middle ear was the primary source of this disease, and the actinomycotic foci under the deep musculature of the neck and under the cranial cavity had arisen by extension of the disease along the incisura mastoidea.

Cozzolino[18] thoroughly examined a case of pseudo-actinomycosis of the ear, which clinically and microscopically was very similar to a true actinomycosis (granules in the pus, muco-sanguinous character of the exudate, etc.). The cause of this disease, the bacillus filamentosus, up to that time unknown, according to Cozzolino, does not belong to the ray-fungi family, and is also to be differentiated from the bacillus pseudoactinomycosis of Sawtchenk and of Krassnobajew, which belongs to the schizomycetes. In contrast to the latter, the bacillus filamentosus is aerobic, stains according to Gram, forms spores, is very resistent to heating and drying, and shows many of the characteristics found by Kruse in the family of the hay bacillus. He laid the piece of tissue obtained at the autopsy for 3 months in 10 per cent.

formalin, which he frequently changed, and at the end of that time made cultures from the pus in the meatus and cerebellum on bouillon and agar. Out of 12 inoculations, he obtained 8 times pure cultures of the germ, although the development of the cultures was slower and scantier.

The demonstration of the bacterium aerogenes (Escherich) in the middle ear of a case of Scheibe[19] that died of purulent meningitis, in which the same bacterium was also found in the meningitic pus, is worthy of mention.

In a serous middle ear exudate obtained by paracentesis of the drum, Barrago-Ciarelli[20] found a blastomycetes very similar to the blastomycetes lithogenes, which he could grow in pure cultures on bouillon and gelatine.

Finally,Schilling[21] proved the pseudodiphtheric bacillus to be the cause of an otitis in a case of genuine croupous otitis media in a patient 24 years old. Anatomically and clinically, the case was characterized by the protrusion of white membranes out of the paracentesis opening in the drum, which were shown by Weigert's fibrin stain to be a fine network of fibrin fibres with granular and globular fibrin. In its further course, the suppuration took on more the character of an ordinary middle ear suppuration. The bacteriologic examination showed diplococci and diphtheria-like rods. "The above mentioned diphtheria-like rods can be regarded only as pseudodiphtheric baccilli, on account of their peculiar properties (richer growth on agar than on blood-serum. notched border of the colonies, not very numerous granular staining, and a pathogenicity for guineapigs). As at the section of the animals experimented on, none of the changes characteristic for diphtheria were found, but on the contrary the presence of pneumonia diplococci was demonstrated, it is probable that the death of the animals was caused by them." At the beginning of the disease, which was characterised by the appearance of white fibrinous membranes, the pseudodiphtheric bacilli were most prominent, but were later supplanted by the ever-increasing diplococci, as the case took on the character of an ordinary otitis media. This fact gives a certain support to the supposition that the original disease is to be ascribed to the pseudodiphtheria bacilli.

We lately saw in the Halle Ear Clinic a case characterised by a similar clinical course, in which, however, the bacteriologic examination, carried out at the Royal Hygienic Institute, showed the presence of the true diphtheria bacillus, in addition to staphylo-and streptococci.

WHICH OF THE ABOVE FACTS ESTABLISHED DURING THE LAST DECADE CONCERNING THE FAUNA OF THE MIDDLE EAR ARE APPLICABLE IN PRACTICAL MEDICINE, ESPECIALLY OTOLOGY?

In the first place, in regard to the prophylaxis, the fact must be acknowledged that the tuba Eustachii is the usual port of entrance of pathogenic bacteria into the ear, and that a weakness of the movement of the tubal cilia opens the way for bacteria to pass from the nasopharynx into the ear.

From this it is evident that the greatest care must be taken to clean out the nasopharynx, as far as that is possible considering the anatomical relations. This is especially necessary in diseases of the upper air passages, in which infectious secretions are present in the nose and naso-pharynx in unusually large amount.

The method of cleansing to be chosen depends on the case and on the character of the secretion found in the nasopharynx. In the majority of cases, it will be sufficient to use a v. Troeltsch nasal douche with a neutral 0.75 per cent. salt solution, or a weak boric acid solution, together with rinsing the mouth. Especially in acute infectious diseases, it is necessary by this cleansing to protect the patient from the imminent danger of an otitis, the more so since here on the one side, the normal protection which the ear possesses in the movement of the cilia of the tube is more or less lost, and on the other hand, the bacterial fauna of the mouth is better developed on account of the lessened masticatory movements of the mouth, resulting in a diminution of the normal power of self-cleansing. That carious teeth should be given the attention that they deserve is self understood.

That by these prophylactic measures, it is possib'e to prevent an otitis is proven by numerous observations at the sick-bed. I myself during my period as a first-year physician passed through a typhoid epidemic, in which not one of 30 patients had an otitis, thanks to the most careful observation of this prophylaxis.

As far as the artificial otitides are concerned, i. e., those following nasal douching, bathing, and use of snuff, the prophylaxis is given by the disease.

If we get a well-developed case of otitis media acuta suppurativa we must use our best endeavors to prevent it from going over into the chronic form. The basis for the prophylactic effort is given by the fact that the tendency to chronicity of an acute otitis makes its appearance when there is a secondary infection of the ear, especially with staphylococci and saprophytes. This knowledge forces us not only to provide for a free drainage of the pus but also to protect the ear against secondary infection. In regard to one way by which this can take place, the external meatus, we attempt to solve this by carefully cleansing, at every change of dressing, the vicinity of the ear and especially the numerous recesses of the auricle, those breeding places of saprophytes, and then guard the ear by an aseptic dressing. As to the other way by which secondary infection can take place, the Eustachian tube, our prophylactic measures agree with those against the origin of otitis in general.

The standpoint of preventing a secondary infection will cause us to limit the paracentesis to those cases where it is actually indicated (i. e., where there is a purulent exudate behind the drum), since a paracentesis opens the way for an infection of the middle ear from without.

Furthermore, in relation to the prognosis, the above progress of our knowledge of the bacteriology of the ear allows us to draw certain practical conclusions, whose possession can be obtained by the bacteriologic examination of the pus in each case of acute otitis media purulenta. If we recognize a suppuration of the ear as a pneumococcal one, the prognosis in regard to its length, course and termination is in general, much more favorable than if it were a malignant streptococcal infection. If it is a monobacterial infection, the above turns out, in general, much better than if it is a polybacterial.

Although the pneumococcal otitides have a relatively harmless character, still the fact that in this form, after a rapid disappearance of the otitis media, the infection can appear in the mastoid or even the cranial cavity, after a period of latency, makes it necessary for us to watch for some time cases of otitis media due to pneumococci which result in a rapid cure, and to acquaint the patient with the possibility of a subsequent return of the infection in the mastoid.

Our knowledge of the otitis media neonatorum, and of the otitis of nurslings, has become broadened and deepened in the last decade. Although v. Tröltsch a decade before had drawn our attention to the significance of the frequent otitis media in the earliest childhood, it remained for a number of diligent workers of the last decade to shed more light on the general and special pathological features of this disease. Aurists and specialists in bacteriology and pathology shared equally in this fruitful work.

The otitis of the new-born and that of nurslings were not always sharply differentiated, and yet this distinction is an important necessity, since it alone gives the solution to the question whether or not there is an otitis media of the new-born whose origin must of course be referred back to the period of intrauterine life.

This question must be answered in the affirmative since the investigations of Aschoff.[22] He was able to put an end to the discussion waged since the 60s as to whether the pus so often found in the middle ear of new-born children was physiologic and perhaps had some relationship to the disappearance of embryonal gelatinous tissue or whether it was to be considered as the end product of inflammation. He came to the following conclusions, based on the microscopic examinations of the contents and mucous membrane of the middle ear of 85 new-born children:

(1) Unless there has been a complete entrance of air after extra-uterine breathing, a fluid is found varying from clear watery-like to that of muco-purulent. In a large number of cases the contents were mixed with constituents of the amniotic fluid. (2) The formation of pus in the middle ear of the new-born is no physiologic process necessary for the formation of the middle ear, since it is not found in all

fetuses, but is rather the result of a very early (from the fourth month of fetal life) entrance of the constituents of the amniotic fluid into the middle ear. This reaches the highest degree in the entrance of large masses of vernix and meconium, which can result in the greatest amount of pus formation, viz., a complete filling out of the middle ear with pus. (3) The mucous membrane of the middle ear of the newborn shows a varied degree of cellular infiltration, which increases corresponding to the amount of irritation of the larger or smaller masses of the constituents of the amniotic fluid — the meconium and vernix — but never reaches the degree that is found in a severe case of infectious otitis media. It may, however, closely resemble the picture of a mild inflammation, if it is supplemented by hyperemia and hemorrhages caused by suffocation. (4) The disappearance of embryonal gelatinous tissue takes place intrauterine, according to developmental laws unknown to us, but not as the result of coarse, mechanical influences, as Wreden, Wendt, etc., thought; the width of the cavity allows absolutely no inference to be drawn as to a pre- or postnatal breathing.

Although, as Wendt has already shown, the otitis media neonatorum has been proven to be a foreign-body otitis, the question of the pathogenesis of the otitis of nurslings and of early childhood has not yet been sufficiently cleared up. It can, however, be seen from the works dealing with the question that this disease is to be considered as a single, sharply defined disease of the middle ear neither from a pathologico-anatomic standpoint, nor from its etiology. The views of the individual authors disagree partially according as each investigator starts out more from a pathologic or anatomic standpoint. There are even those who claim that the exudate found in the middle ear of 80 to 91 per cent. of all children during the first four years of life is often of preagonal or agonal origin. Berthold[23] especially, takes this position and says that in the condition of preagonal and agonal somnolence the mucus of the naso-pharynx gets into the middle ear. The micro-organisms entering with the mucus develop and cause an otitis, which could be called an otitis media infantum moribundorum. Even more skeptical as to the frequency of otitis media in early childhood is George Paul Veillard[24], who on the ground of the findings at 80 postmortems, comes to the conclusion, in many cases, of a "simulating-otitis." This author found in 30 per cent. of his case pus in an otherwise normal middle ear, all cases where the pus had entered from the diseased naso-pharynx into the healthy middle ear, and the mucous membrane in only a few times had reacted by injection of its vessels. In the cases, however, of otitis and not "simullating-otitis," the author found an involvement of the bony walls of the middle ear, which has lately been confirmed by Politzer[25], who demonstrated an accumulation of round cells in the medullary spaces of the spongiosa.

Although the investigations of Veillard (l. c.) show that the otitis media in early childhood is often no true otitis, and although the view of Berthold, that in many cases we have only to do with a preagonal or agonal incident, has much in its favor, the generally severe character of the disease has been well shown by the work of Hartmann [26] and [26]a, Geppert[27], Barth[28], Ponfick[29], Heermann[30], and Weiss.[31]

The results of the bacteriologic investigations of the individual authors do not agree. The results of Kossel, who examined bacteriologically 88 cases in the Berlin Institute for Infectious Diseases, differ considerably from the corresponding findings of the earlier investigators, Rasch, Netter, Gradenigo and Penzo. The consensus of the findings show beyond doubt that the otitis media acuta of nurslings is no etiologically circumscribed disease, but that widely different microorganisms play a causal role in its orgin, as in the pathogenesis of otitis media acuta in general.

Though the authors just mentioned lay a too one-sided stress on the bacteriologic standpoint in regard to the origin of the nursling's otitis, and though others lay a too one-sided emphasis on the anatomical susbtratum, Weiss[31] has skilfully avoided this one-sided view by combining the bacteriologic and the anatomic examination of the middle ear. He examined the middle ear of 28 nurslings, mostly pedatrophic, who had died from diseases of the respiratory and digestive organs. The most important result of his histologic investigation is that it is always possible to demonstrate the presence of the embryonal character of the nursling's mucous membrane of the middle ear. "Even where the densest infiltration makes the recognition of this structure of the mucous membrane almost impossible, the layers lying deeper and near to the bone, which have been protected from the extreme cellular infiltration, show plainly the stellate cellular network in the homogeneous ground substance." Weiss recognizes in this deviation from the character of the mucous membrane of the adult a "factor of probably etiologic value in explaining the enormous frequency of middle ear disease in nursing babies and its very special form." The acceptance of a tissue predisposition, which possibly consists in a greater sensitiveness and vulnerability of the characteristic mucous membrane of that period of life, makes us understand better the peculiarities of the otitis of nurslings. The bacteriologic investigations of Weiss confirm the statements of earlier investigators—Kossel, etc.—that the otitis of nurslings is caused by the known forms of germs; the infection can take place either via the Eustachian tube or the blood. Note should be taken of the frequent finding of the diplococcus pneumoniae, 42 per cent., to which Weiss acribes the relative benignancy of the otitis of nurslings, as well as the slight tendency to rupture of the exudate through the drum.

Although, according to the above investigations, the otitis of nurslings is characterized as a genuine local disease of the ear, Heermann[39] considers it only as an accompanying symptom (otitis concomitans) a result of the marasmus caused by other diseases: "The concomitant otitis very seldom, only when it reaches an intense degree of inflammation, leads to spontaneous rupture of the drum, the genuine almost always cause a perforation, or by the severity of its symptoms calls for instrumental interference. Now since the one leads to the same complications as the other, empyema of the mastoid process, meningitis, otitis pyemia and sepsis, their differentiation is impossible, if only the end of the process is regarded." This view of Heermann seems to rest upon confusion of effect and cause. Much better grounded is the view of Ponfick[29] with respect to the pathologic relation of the otitis of infancy, who regards the inflamed middle ear as often the result of a secondary disease Ponfick, who examined 100 children up to 4 years of age, of whom almost three-fourths belonged to the first year, found that among 6 children dying of acute, non-infectious processes (congenital heart failure, etc.) 5 had otitis media purulenta, which speaks against the view of Heermann. Of 65 dying of acute infectious dermatitides (furunculosis, erysipelas) diphtheria, scarlatina, inflammatory thickenings of the lungs, purulent meningitis and gastroenteritis infantum, only 7 had a normal middle ear, while 58 had severe inflammation, the exudate being occasionally serous, but usually purulent (eight times unilateral, 50 times bilateral). In speaking of the relation between gastroenteritis and pneumonic foci, Ponfick claims that both respiratory and intestinal disturbances can be induced either simultaneously or immediately subsequently by infection from a general focus, viz., the ear. In10 other cases, where the autopsy was negative except for a moderate enlargement of the spleen, the middle ear was the only organ showing considerable changes. These investigations of Ponfick show that the life of the nursling can be as much threatened by an otitis media alone, as by inflammation of the air passages. The fatal end need not be caused by the appearance of an intracranial complication, but comes rather from the entrance of the toxins of the otitic process into the nutrition. According to Ponfick, the otitis is not only a local but also a general affection, and not as Heermann claims, the accompaniment of a general disease. That the otitis is not a focal but a general disease is confirmed by the feverish state, the frequent enlargement of the spleen, the degenerative processes noted by Ponfick, especially in the kidneys and liver, the intestinal disturbances, etc. Among 19 children dying of chronic infectious diseases (16 tuberculosis, 3 syphilis congenita) the drum was found only once uninvolved.

The results of the investigations of Hartmann[26]a on the influence of the otitis media of nurslings on the nutrition confirm Ponfick's view as to the general pathologic relationship of otitis media in early childhood. His conclusions are as follows:

1. The otitis media of nurslings may be accompanied by

nutritive disturbances, which find their expression in disturbed digestion and loss of weight.

2. With the discharge of the pus, by paracentesis, the digestion in these cases may again return to the normal, and the loss be followed by a gain in weight.

3. Increase of temperature which appears in the course of an intestinal disease in nurslings may be caused by an otitis media.

4. In all intestinal affections of nurslings accompanied by increase of temperature and loss of weight, the ear should be examined for the traces of inflammation.

THE PRACTICAL APPLICATION OF THE FACTS CONCERNING OTITIS MEDIA OF INFANCY ARE SELF-EVIDENT.

It is not necessary to state that the aurist must treat this form of otitis with the same care as every otitis of later childhood and adult life. This otitis has a special place in therapy since the drum shows a slight tendency to rupture spontaneously—less the result of the so-called "relative benignancy" of the otitis than of the great resistance of the tympanic tissue of the child—and since, in spite of the purulent contents of the middle ear, the local symptoms are frequently entirely masked by the general. The cause of this is perhaps that the wide tube of the child allows a freer exit of the secretion toward the throat, and therefore the retention of pus, with its severe local symptoms, occurs less readily.

Although the lack of retention makes the danger of intracranial complications less probable, the flow of the pus through the tube into the throat increases the danger of secondary disease of the intestinal tract, with the resulting severe disturbances of nutrition.

This danger puts the paracentesis needle in our hands much more frequently than is otherwise the case. Even when there is no fulminating symptom present, it is our duty to bring about the flow of the pus utward, and thus prevent its flowing into the tube.

The general practitioner should lay to heart the lesson taught by the above facts, viz.: that every nursling with general symptoms, with intestinal disease, with catarrhal disease of the lungs, with diseases of the nutrition, etc., should have its ear carefully examined, even when no symptom on the part of this organ seems to indicate an examination of the same.

But above all, the above general pathologic relation of the otitis media in early childhood makes it necessary for every pediatrist to be thoroughly conversant with the examination of the ear of children. If he lacks this ability, he is frequently in danger of diagnostic error and of completely overlooking the facts, resulting in the probability of failure of his therapy.

Anyone who believes that otology is a narrow specialty, having few points in common with general medicine, can easily learn differently from the numerous works that have appeared in the last decade, which have demonstrated the numerous points in common of general medicine and otology. I have used the words "points in common" and should like to insist that in the last decade not only has the pathologic anatomy of the ear received great amplification on account of its close relation to general medicine, but the latter, also, has been enriched and advanced by otologic investigations. I need only speak of otogenous pyemia which has radically changed our views of the pathogenesis of pyemia, in general.

The works of the last decade that deal with the relation of diseases of the middle ear to other general and local diseases are so numerous that we must pass over those that contain only a theoretical exposition of our science.

A complete change has been wrought in our views as to the relation between diabetes and diseases of the middle ear.

Although formerly it was believed that the middle ear disease in diabetes was specific, and though, above all Kuhn, Körner, Walb, and Wolff taught that in diabetes the mastoiditis was primary and the otitis media secondary, Davidson[32] insisted that the diabetes was only a predisposing factor in bringing about the disease of the ear. Brieger[33] took the same standpoint, since he ascribed to the diabetes no causal role in bringing about the otitis media, and credited it with influencing an intercurrent otitis media only in so far that he accused it of intensifying the process, and of perhaps favoring the development of the wide-spread necrosis. Eulenstein[34] has dealt even more thoroughly with the question of a specific "otitis diabetica," by critically reviewing the 46 cases reported in literature. "If we examine the material before us objectively and onsider that the picture of the otitis diabetica s. necroticans was formulated at a time when there were only a few observations, we must say that this picture owes its origin to a generalization of a few observations which have not been confirmed by subsequent investigations, and the view of certain authors is not correct; wc will come closer to the actual condition if we speak of an otitis media of diabetics in the sense, that under conditions still to be determined an otitis media purulenta in a diabetic patient may easily cause severe complications in the mastoid or middle ear, which are usually manifested by a rapid extension of the process and extensive carious destruction of the bony tissue, and occasionally by actual necrosis of the bone." The "conditions still to be determined" of Eulenstein are the following: 1. The anatomic construction of the mastoid (pneumatic, etc.). 2. The favorable culture media for the most varied germs, brought about by the diabetes. 3. Arteriosclerosis with its consequences in tissue necrosis. 4. The severity of the infection.

I have shown[35] that not only does diabetes mellitus give a distinct anatomic and clinical character to middle ear disease but also that ear disease may elicit the chief symptom of deranged metabolism, viz., glycosuria. Although both cases, observed in Schwartze's clinic, are cases of otitic intracranial complication, still mention may be made of this phenomenon at this place on account of the interesting general pathologic relation of the glycosuria. The few cases heretofore reported in literature dealing with the causal relationship between otitis and glycosuria will not stand a critical examination. The two following conditions must be fulfilled in showing a causal relationship between otologic sequelae and sugar in the urine: first the proof that there was no sugar in the urine before brain disease, and second the proof that the glycosuria that appeared during the otitic complication disappeared completely after the brain affection healed. Both conditions are fulfilled by the two cases observed by us in the Halle ear clinic. In the first patient, suffering with chronic middle ear suppuration, the urine on entrance was free from sugar, the patient eating a mixed diet. During the exacerbation of the cerebral symptoms, already present at his entrance, there developed a stubborn glycosuria. This entirely disappeared after a large mass of exudate had been removed from the cranial cavity, by an operation. It cannot be settled whether the glycosuria in this case is to be regarded as a result of a sympathetic exudate into the ventricles, caused by an intraventricular increase of pressure, especially in the 4th ventricle, since clinical experience teaches that glycosuria does not always appear in every case of such an otogenic, intravenricular increase of pressure. The second case was that of a 47 year old man, with a right-sided acute middle ear suppuration, and an extradural abscess the size of a cherry, in the posterior cranial fossa. The urine of the patient on entrance was likewise free from sugar, on a mixed diet. Two days later, the same patient, on the same diet showed sugar in the urine, which completely disappeared after the abscess was emptied by an operation. On account of the small size of the extra-dural pus focus, we do not believe that any considerable increase of pressure in the cranial cavity can be assumed as the cause of the glycosuria. We think the most probable explanation is that the glycosuria was caused by tonic influences and cite the analogy of the glycosuria observed in phlegmonous acne and septic processes, which are designated as toxic.

While according to the above, our knowledge of the relation between diabetic anomalies of metabolism and otitis has received a considerable accession by the labors of the last decade, much has been written concerning the relation of the uratic diathesis to the ear but nothing had heretofore been definitely proven. It was therefore a great service of F. Alt[36] when by means of experiments in metabolism he investigated thoroughly in otosclerotic patients the theory held especially by English authors, of a causal relationship between sclerosis and uratic diathesis. The results of his investigations in no way affirmed such causal relationship, so that we can no longer regard gouty anomolies of metabolism as an etiologic factor in sclerosis.

As to the relationship of middle ear diseases to other general diseases, Schwabach[37] has added another case to the single one of Habermann, of disease of the ear in pernicious anemia, in which hemorrhages were found in the sound perceiving apparatus. The histologic examination of Schwabach's case showed that the sound perceiving apparatus was normal, while the middle ear showed wide-spread changes. They consisted of more or less extensive extravasations of blood, especially on the floor of the middle ear, in the niche of the oval window, in the drum (subepidermoidal, hemorrhagic vesicles), and in the cells of the mastoid. In addition, there were signs of a secondary inflammation, probably caused by infection from the naso-pharynx, consisting of infiltration of the middle ear mucous membrane with round cells, overfilling of the blood vessels, desquamation of the epithelium at different places, perforation of the drum, etc.

The same author has increased our knowledge of ear diseases in acute leukemia by a critical review of the whole literature on this subject, as well as by the addition of 5 cases examined microscopically by himself. Although in leukemia, the changes affecting the inner ear are the most striking, the middle ear often shows characteristic, specific changes. Of the fifteen cases including his own which were examined upon an exact anatomic basis, the middle ear twice showed nothing particular, and was once found normal. In the remaining cases, the following pathologic changes were found in the middle ear : free extravasation of red and white blood cells or the remnants of them, either in the middle ear alone or at the same time in the antrum mastoideum; masses of lymphocytes in the vessels of the mucous membrane of the middle ear, sometimes in greater numbers, sometimes in greater extent; infiltration of the mucous membrane of the middle ear with lymphocytes or hemorrhages; in one of his own cases there was found a fibrino-purulent exudate with numerous colonies of bacteria. Schwabach concludes that the presence of diseases of the ear is not caused, as Gradenigo thought, by a previous or simultaneous inflammatory process in the ear, but that the leukemic exudation of lymphocytes can come about entirely independent of any such processes, while the hemorrhages are to be referred to changes in the blood vessels similar to those caused in other organs.

In regard to the relation of middle ear disease to measles, the works of Bezold[39] and Rudolph[40] show that otitis of measles presents certain characteristics both in an anatomic and in a clinical sense. They regard the purulent inflammation of the middle ear cavity as an integral, specific part of measles, and base their opinion on material consisting of sections of the ears of patients dying of measles. "The entire form of the inflammation of the mucous membrane of the middle ear, its varying extent in different regions, the macular and punctate injections, the extravasation of blood, and perhaps the small granulations rapidly forming in different places lead to a comparison of the mucous membrane diseases to the exanthema of the skin, and the constant pathologic findings of this form are best explained if they are regarded as analogues of the exanthema of the skin."

Lomel[41], in view of the report of 25 postmortems in the clinic at Basel, had to abandon the opinion that an otitis media was a part of the picture of a diphtheritic disease of the respiratory organs; the middle ear inflammation is no genuine disease but a part of the general infection. Among his postmortems, there was only once a normal middle ear, but in the other cases there was every possible quality of otitis media, though only twice specifically diphtheritic. The correctness of Lomel's view was later confirmed by the much more extensive investigations of Levin (l.c.) at the ear clinic at Graz. In 63 per cent. of the diphtheria cases examined, Levin found an involvement of the ear, a frequency which depends chiefly on the youth of the patients. In children under 5 years, he found otitis in 84 per cent of all pos tive cases of diphtheria, in children between 6-10 in 13 per cent. 11-15 in three per cent. and 0 per cent. in those above 15. The nature of the concomitant otitis was usually a simple exudative otitis media, rarely was it a tubo-tympanal catarrh. In a very few of the cases, symptoms of a severe form of otitis acuta appeared. Very seldom was there a spontaneous perforation of the drum. Specific, diphtheritic inflammation of the middle ear was found very rarely by Levin; the otitis of diphtheria usually presented the pathologic-anatomic picture of the ordinary otitis media. We have already referred to Levin's view that it is of a toxic nature and hematogenetic. Levin's law as to the predisposition to diseases of the ear in children in the first 5 years of life, who are suffering with diphtheria, has lately been confirmed by Stangenberg[42] on the large material of 1000 cases of diphtheria in the Epidemic Hospital at Stockholm.

As to the relation of Bright's disease of the kidney to the accompanying hemorrhages from the ear, we have the pertinent work of Haug[43]; "Since we know that all these hemorrhages occur without any special gross lesion, by diapedesis, we can assume that the same happens in aural hemorrhages. We have, therefore, in the ecchymoses of the drum, in the bloody suffusions of the mucous membrane of the middle ear, in the labyrinthine hemorrhages, and in the hemorrhagic transudation into the middle ear itself, the pathologic-anatomic finding reported in the literature, analogous to the above-mentioned hemorrhages into the organs, on a nephritic basis."

Jehangir S. Cursetji[44] made the first report on the complication of the bubonic plague by an acute otitis media. According to him, the otitis in plague becomes suppurative. In the fibrinous, serous, sero-sanguinous, or sero-purulent aural discharge, he was able to demonstrate the pest bacillus. The aural complication was found in 2 per cent. of the cases treated in the hospital, but in 10-20 per cent. of cases with buboes in the region of the parotid or submaxillary glands or the throat. 70 per cent. of the cases ended fatally by meningitis.

From Schwabach's[45] work on tuberculosis of the middle ear we find that the otitis media tuberculosa may appear under the clinical picture of an acute otitis media, and that there is a relative frequency of paralysis of the facial in tubercular middle-ear suppuration. According to Schwabach's calculation, which is based on a material of 3737 suppurations of the middle ear, paralysis of the facial occurred 18 times as frequently in tuberculous as in non-tuberculous suppurations.

Scheibe describes a form of chronic middle ear tuberculosis which does not manifest itself like the "phthisical" form in rapid destruction of tissues, but may remain stationary for years. In such cases he found transitory formation of a gray adhesive deposit on the mucous membrane of the vicinity, which microscopically resembled the fibrinous deposit in otitis externa crouposa, but unlike that, was not detached in toto, but gradually disppeared and seldom returned. Numerous tubercle bacilli were found within the deposit. The histologic examination showed that it was a fibrin-like mass, which did not accept Weigert's stain, and which is to be regarded as identical with the fibrinoid of Schmauss and Albrecht (Virchows Archiv. Bd. 144, Suppl-Bd, 1896).

"The matrix is a clear, granular mass, partially fibrinous at the periphery, which stains little or not at all, and which does not accept the Weigert stain. In this granular, globular mass, are found certain large bodies of irregular jagged form which are differentiated from their surroundings by a somewhat stronger susceptibility to stains. The jagged bodies often long are perhaps partially explainable as remnants of cells, but partially, by their arrangement, they resemble connective tissue elements. Vessels are nowhere found in the deposit. Although in one case, distinct cells are completely absent, in another in which the granular matrix was present in smaller amount and more deeply stained, cells with a large, round, pale nucleus were at least indicated, and here and there, scattered over the entire specimen, were found numerous well stained leucocytes with a nucleus or several fragments. At certain places in this case, the tissue structure was plainer, so that it seemed as though there was neurotic tissue at these places."

In the peculiar anatomic relations of the child's mastoid we have an explanation of the fact that the disease of the child's ear has a special place, and also that the ear is more disposed, in general, to disease than is that of the adult; in the same way the width of the child's tube enplains why in tuberculous disease of the lungs and upper air passages infectious material enters the ear so easily and causes a tuberculous disease of the same. That middle ear tuberculosis is probably much more frequent in children than is generally believed, has only recently been shown by

Licci.[47] By injection experiments he has shown that many otitides in children, which progress under the clinical picture of an ordinary chronic suppuration, are of tuberculous nature, and the tuberculous character of the middle ear suppuration is only obscured by the presence of other germs. Of course we may ask whether the simple suppuration was not the primary and the tuberculous the secondary condition. As to how far the tuberculous taint is responsible for the presence of middle-ear disease in children has been investigated thoroughly by Ostmann[48] on the school children of the district of Marburg. He comes to the conclusions that the tuberculous taint favors the origin of ear disease and cxerts all unfavorable influence on it in proportion to the severity of the taint. The connection between the tuberculosis of the nearest blood relations and the predisposition of tuberculous tainted children to diseases of the sound conducting apparatus must be sought, according to Ostmann, in the increased irritability of the mucous membrane of the upper air passages, especially of the nose and throat; and the further fact that in them the diseases of the ear invariably lead to severer disturbances in hearing than is generally the case in similar diseases, can be explained only by the supposition that their constitutions possess a lessened resistance to injurious elements.

As to the relation of the middle ear to abdominal typhus, Suckstorff[49] found eight cases of otitis media (7.7 per cent.) in 90 of typhoid during the typhoid epidemic at Rostock in 1900, which can be called a severe one on account of the high percentage of mortality, 13.4 per cent. These began between the 17th and 28th day of the disease, confirming our experience. There was mastoid involvement in only two cases. one of which was complicated by extradural abscess in the posterior cranial fossa and destruction of the sigmoid sinus.

That middle-ear disease is more frequent in typhoid children than adults is shown by the statistics of Schuhmacher[50], who thereby performed a considerable service, since no comparison of the ear diseases of typhoid children, etc., has heretofore been made. Of 100 ears of typhoid children only 29 were normal. In 31 cases the mild character of the inflammation manifested itself in injection of the vessels of the handle of the hammer. Simple catarrhal inflammation of the middle ear and the Eustachian tube was present in 32 cases, acute middle ear suppuration in 11 cases, of which 6 were bilateral. These middle ear diseases appeared 4 times in the first week, 11 times in the second, 11 times in the third, 14 times in the fourth and 4 times in the other three weeks. A glance at these numbers shows that the frequency of middle-ear diseases in typhoid children is not explainable by the great frequency of middle-ear affection in childhood; it must, perhaps, be admitted that the ear of a child with abdominal typhus is in more danger than the ear of an adult with a similar disease.

CAN PRACTICAL CONCLUSIONS BE DRAWN FROM THE FINDINGS WHICH HAVE BEEN SUPPLIED BY THE LABORS OF THE LAST DECADE IN REGARD TO THE RELATION OF THE DISEASES OF THE MIDDLE EAR TO OTHER DISEASES?

This question, as far as infectious diseases is concerned, can at once be answered in the affirmative. The special feature is the prophylaxis, and in the same sense in which we have already spoken in the discussion of the bacteriology of the diseased ear.

As far as the prognosis of otitis media is concerned we have shown above what an important point in making a correct diagnosis is furnished by the recognition of the bacteria found in the aural discharge. The fact proven by Schwabach that tuberculous middle ear suppuration may resemble an ordinary acute otitis media is an additional proof of the importance of a bacteriologic examination of the discharge in those cases where we wish to avoid gross prognostic and diagnostic errors.

The fact lately insisted on by Bezold and Rudolph, that an otitis media is an integral part of every case of measles, makes it the duty of the general practitioner to pay special attention to the ear in every case of measles, even when absence of aural symptoms makes an examination of the ear seem superfluous.

As to the practical value of the facts concerning the relation between the ear and diabetes, the statistics of Körner (*Deutsche Arch. f. Klin. Medizin Bd.* LIII., S, 588) showing that acute middle ear suppurations lead to temporal bone disease much more frequently in diabetics than in patients not suffering with this disturbance in metabolism demands the greatest solicitude for the free exit of the pus from the middle ear. If the suppuration does not heal in a short time, but continues in an undiminished amount, considering the great danger of the rapid extension of a destructive bone process in the mastoid, the opening of the latter is indicated even when no exact symptom is present of the existence of a suppurative process in the bone; although Kuhn, Körner and Kirchner have shown rapid necrotic processes can run their course in the mastoids of diabetics, without any external signs of inflammation.

While König and Kraske have successfully fought the position of the surgeon against operations on diabetics and have shown it to be untenable, the change of view brought about by them must itself suffer change, in the prognosis of the aurist as to operations on diabetics, the more so as we have gradually come to recognize in treating mastoid affections of diabetics, that we are not dealing with a specific affection but with a form of disease which shows an increased tendency to malignancy on the basis of diabetic anomalies of metabolism.

How this change has been brought about is shown in the numerous reported results of operations on the mastoids of diabetics which have appeared in the last decade.

The favorable results have been overwhelmingly in cases of mild diabetes, while in severe cases with positive Gerhardt's ferric-chloride reaction, the operation has often caused fatal coma.

That the danger of the coma can be avoided by an antidiabetic diet preceding the operation is generally accepted. The greatness of this danger finds full expression in the increase of excretion of sugar however transitory, after the operation, in spite of constant diet, which has been reported by some authors even in cases of mild diabetes. The danger to the diabetic in the operation seems to consist in the fact that an unstable metabolism is so acutely disturbed by the operation that an equalization of this disturbance does not always follow in time.

Many valuable observations have been made during the last decade on those diseases of the middle ear in whose origin the mechanical factor of an inequality of the air pressure in the middle ear and that of the atmosphere, or surrounding medium, plays a causal role,

Koch made a valuable study of the influence of diving on ear diseases by examing 29 divers of the diver's course at Wiesbaden. He saw the following pathologic changes:

1. Retraction of the drum, which was greatest at the membrana Schrapnelli, even causing perforation at that position.
2. Vasomotor disturbances of different degrees, manifesting themselves in the different forms of more or less prominent congestion of the drum, and sero-sanguinous transudate into the middle ear, with formation of red vesicles behind the drum.
3. Rupture of the drum (only in atrophic drums).
4. Acute middle-ear inflammation caused by the high pressure in the nasopharynx driving the mucus situated in or before the mouth of the tube into the middle ear.

Alt, Heller, Mager, v. Schröter[52] have studied the pathologic action of change of pressure on the ear and especially the middle ear by examining caisson workers and by experiments on animals. The etiologic factors for the pathologic changes are on the one hand the mechanical factor of the unequalized difference in pressure in the middle ear and the surrounding space, and on the other the gas emboli appearing in the bloodvessels after sudden decompression. The most important for the disturbances in the region of the middle ear is of course the first factor. During the compression, which causes a negative pressure in the cavum tympani, by preventing the movements of the tube, we may have retraction of the drum with livid discoloration, ecchymoses, ruptures and hemorrhages into the middle ear. Likewise, in decompression, as a result of the failure of equalizing pressure, we have bulging of the drum with injection, hemorrhage into the drum and meatus and rupture.

The mechanical factor of the inequality of the intratympanal and external air pressure plays often a considerable role in the origin of the middle ear diseases caused by adenoids. In addition to the gradual absorption of the air in the middle ear, the following factor, according to Barth, comes into consideration as the cause of the great retraction of the drum: during every act of swallowing the soft palate is lifted in a high bow, in many cases reaching higher than 1/2 the height of the choanae. During this muscular act, the adenoids are pressed in all directions, and of course toward the openings of the tubes so that they are completely shut off from the entrance of the air during the act of swallowing. In addition to this, there is the sucking action exerted by the soft palate as it returns to its postion of rest. This is caused by the sinking of summit of the palate before it is separated from the posterior pharangeal wall.

The changes on the drum and the middle ear caused by mechanical factors, belong to those caused by the action of explosions. Muller in about one half of a large number of cases examined immediately after artillery practice, found hyperemia and even hemorrhage into the drum, and in one ear, previously normal, found a vesicle of blood.

IN REGARD TO THE MIDDLE EAR INFLAMMATIONS WHICH HAVE BEEN ASCRIBED TO CERTAIN NERVOUS INFLUENCES, there has always been a certain scepticism, the more so as the experiments to produce pathologic changes in the middle ear after section of the trigeminus, after analogy of experimentally produced eye diseases, have led to contradictory results, (Hagen, Gellé, Berthold, Baratoux). The case of Asher[55] is of importance, since that author does not use the mystical "trophic" nerve fibres in explaining a severe exudative otitis media that occurred 3 weeks after resection of the 2nd and 3rd branches of the trigeminus (on account of neuralgia).

According to him, the otitis media came about in the following manner: vasomotor disturbances caused either by the destruction of the vasomotor fibres running in the trigeminus or those which rising in the sympatheticus, later join the trigeminus, or by reflex excitation of the vasodilator, caused by processes at the stump of the trigeminus. Then entrance of germs into the thus sensitive space from the nasopahrynx, diseased in this case, through the permeable tube. In this case, hypothesis has a wide play, and it is possible, in view of the existence of a purulent inflammation in the nasopharynx, that the otitis media was a complication independ ent of the resection of the trigeminus.

Kraus[56] in considering the otitis media following resection of the trigeminus, agrees with the view of Asher that the tissue possessed a weakened resistance on account of the loss of nervous influence, and thus became a favorable medium for the growth of germs, without giving any satisfactory reason for his opinion.

The general pathology of the ear has received an incalculable aid both theoretically and practically, by Braunstein's and Buhe's[57] proof of the non-existence of vessel communication between middle ear and labyrinth, although this had been generally accepted since the comprehensive investigation of Politzer. Apparently everybody had accepted Politzer's view, although Siebenmann as early as 1890, in his corrosion experiments on the temporal bone, could not convince himself of this communication, and Eichler in 1892, in his beautiful investigation on the blood current in the human labyrinth, had directly contradicted Politzer's statement. The microscopic preparations of Braunstein and Buhe—stained with eosin and hemotoxylin, show that the blood vessels passing from the mucous membrane of the middle ear into the bone run to the inner layer of the compact substance, and end here or bend upon themselves and run parallel to the bony lamellae. They never penetrate the cochlear capsule or make anastomoses with the labyrinthine vessels.

SPECIAL.

ANOMALIES OF DEVELOPMENT AND MALFORMATION, whether they affect only special parts of the middle ear or have led to a complete change of form of the same, with or without involvement of the outer ear, are not uncommon; nevertheless the individual anatomic findings should be reported because, on account of lack of operative treatment of these abnormalities, we very seldom have an opportunity of completely studying the abnormal anatomic conditions in each case. Of the anomalies affecting the contents of the middle ear, those of the ossicles are of special interest.

So, e. g., Tomka[58] found in one case that the stapes had only one crus; at the same time the eminentia pyramidalis and the musculus stapedius were absent. In a second case, the stapes had the form of a triangular piece of bone. It was a persistence of the original form of a bone, insofar as the space formed by the passage of the art. perforans staped. between the cura of the stapes had not developed. Furthermore, he described[59] an interesting case of supernumerary ossicles. In one case there was, between the anvil and the medial wall of the middle ear, a piece of bone 5mm. long covered with mucous membrane, and having a smooth surface. The origin of this structure is to be referred to the development in the inferior maxillary process, in addition to the cartilaginous anlage for the hammer and anvil, of a third cartilaginous anlage in the immediate vicinity of the anvil, from which the accessory bone was developed. In Hammerschlag's case[60] of a 20 year old woman with middle ear diminished in every dimension, the hammer and anvil were of normal size while the stapes had a small foot plate, corresponding to which, the oval window was smaller than normal. Furthermore the crura of the stapes were so pressed together that they gave the impression of a single crus. In the left ear of a syncephalus janiceps asymetros child was found a persistent arteria stapedia, a vessel which, after its appearance in an earlier epoch of embryonal development, soon disappears. In this case, it arose from the arteria carotis interna and piercing the floor of the middle ear, entered the latter. From here, enclosed in a bony canal, it passed in front of the promontory, through the stapes toward the roof of the tympanic cavity where it passed through an opening in front of the hiatus spurius into the cranial cavity. Here it ended in a lateral branch that anastomosed with arteria meningea of this side, and in a medial one that anastomosed with the vessels of the orbit and branched on the cerebral surface of the large pterygoid processes of the sphenoid. A hitherto undescribed anomaly of the stapes, viz: a congenital adhesion of its posterior bar to the wall of the Fallopian canal, has been described by Politzer[62]. It was in the temporal bone of a deaf-mute. The niche of the oval window was very shallow, and thereby the posterior bar was brought closer to the facial canal than normally. At this place, there was a dehiscence in the wall of the facial canal, and the posterior crus of the stapes was directly adherent to the wall of the canal.

The cases of D. Kaufmann[63] and Haug[64] dealt with anomalies that concerned the entire middle ear.

In Kaufmann's case the specimen came from an 85 year old day-laboring woman, accidentally killed—the malformations were confined to the external and middle ears. The conchae of both sides were badly distorted, the external meatus was absent, the os tympanicum on both sides was completely malformed, i. e., in its place was a tumulous mass of bone, which passed over into the surrounding bony part (root of the processus zygomaticus and mastoid). On neither side was there a trace of a drum. The tympanic cavities were abnormal in that the Eustachian tubes did not extend so far posteriorly. In the tympanic cavity were a number of irregular spaces bounded by plates of bone and connective tissue, which were joined to the ostium tympanicum tubae and the internal wall of the middle ear, in the angle between the anterior and external semicircular canals. With the exception of the absence of the antrum, the mastoids were normal. While in the right ear the hammer and anvil had developed as a single piece of bone, the ossicles of the left, bound together by normal articulations, formed a body which lay in the recessus epitympanicus—enlarged in every direction—while the ossicles did not seem to lie in the tympanic cavity itself, since the handle of the hammer was not developed, and the long process of the anvil was malformed." "The processus longus of the anvil was curved forward and inward, and was thicker than normal and lengthed. An articular facet for the stapes was not visible."

Of importance was the fact that the carotid canal did not extend as far posteriorly as normal, so that the distance between the knee of the carotid canal and the anterior margin of the fenestra ovalis was less than is usually the case. The whole labyrinth as well as the nervus acusticus was found normal after a careful microscopic examination

In addition to this case, Kaufman described another specimen from the pathologic-anatomic institute at Vienna, in which there was likewise an absence of the external meatus, drum and os tympanicum; this specimen showed a higher degree of malformation in so far that in the middle ear there was only a remnant of the tube to be found, while all the rest was a compact bone, containing little spongiosa.

In both cases, Kaufmann considers that the disturbance in development took place in a very early time of embryonal life, viz., at a time when the external meatus had not developed. While in the first case, "later—from the stage of the absent meatus—the ear had as a whole developed normally" in the second case, on the right side, the development of the ossicles had entirely failed.

While Kaufman, in regard to the cause, seems to concur with the view of Virchow that in these malformations, it was not a question of a simple retarding of development, but rather that an irritative process unknown to us for the present must be assumed, it seems to us that his first case with its multiple bony and connective tissue plates in the middle ear which can be regarded as the remnants of an intra uterine inflammation speaks for the correctness of that assumption.

In the case reported by Haug, (l. c.,) of a unilateral congenital malformation, the specimen came from a female child that died shortly after birth. Accompanying the normal formation of the labyrinth, there was a high degree of malformation of the concha, a stenosis of the external meatus nearly reaching an atresia, a small middle ear with a badly formed drum; all ossicles were abnormally developed, the hammer was inserted into the drum, and articulated with the formless anvil. The stapes was firm in the oval window, but was not articulated with the anvil. The tube was represented by a solid piece of bone, the musculus stapedius was absent, the facialis was very thin. Furthermore, the pars squamosa of the temporal bone had never developed, the lower jaw on that side was malformed, and this was the cause of the palpable asymmetry of the face."

As to the DISEASES OF THE DRUM, a new light has been thrown on the etiology of the epithelial pearls of the drum first described by Urbantschitsch by the discovery of such pearls in a linear paracentesis cicatrix by Habermann (v. Schwartze, Handbuch der Ohrenheilk. Bd. I. S. 238) and Grunert[65]. The depicting of such multiple pearls by Urbantschitsch makes it appear without doubt that those structures are true, perhaps congenital, tumors. This view is strenghtened by the complete microscopical findings of Wendt, etc. The case of Habermann and of mine, on the contrary, shows that these structures have no special etiology. If especially in our case, in which the new formations did not appear until after the cicatricizing of the paracentesis wound, we would think of a causal relationship between them and the paracentesis incision, the results of the experimental and clinical investigations of Kaufmann[66] and of Blumberg[67] would give a certain support to the view, that these structures were derived from epidermis which was accidentally implanted into the tissues of the drum by the paracentesis section. But the epidermis which in the socalled mammiliform perforation frequently grows over from the free surface into the opening (Katz, etc.) must also be thought of as a possible origin of these structures. In this way also, its position is shown as a structure differing from cholesteatoma not in any principle but in degree, although Leutert has given us a very plausible explanation for the origin of a distinct form of cholesteatoma in this way, viz., by transplantation of pieces of epidermis of the drum into the granulation tissue lying behind it, by means of instrumentation. To the new formations of the drum also belongs a case of osteophyte formation on the handle of the hammer, which Singer[68] reported. The drum showed the objective signs of chronic inflammation; at the location of the hammer was a semicircular, white, projecting bow, with very small jagged projections, which seemed to include the auterior fold and the short process, and reached to the middle of the periphery of the drum. Palpation with the probe showed that it was a case of osteophytes. In our opinion, it was a case of inflammatory new formation. We consider the osteophytes as the products of an ossifying inflammation of the soft covering of the handle of the hammer, after the analogy of osteophytes of the meatus, which in chronic otitis media often appear as sequelae of a concomitant ossifying periostitis of the meatus. We do not think that Singer's case was one of congenital exostosis of the hammer for this does not usually reach the size described here, but appears as small needleformed and spinous projections of bone.

Out of the profuse discussion of the last decade concerning trauma of the drum, we select. as belonging to the very rarest occurrences, a case of emphysema of the membrane, which Haug (1. c.,) has described. The emphysema, in this case a part of an emphysema of the regio mastoidea, was characterised by several vesicular prominences of the cutis layer from the size of a lentil to that of the head of a pin, which in part were bloody. The mucosa and substantia propria of the very delicate drum were ruptured by the sudden entrance of air into the middle ear.

Corradi[70] has made a very complete study of ruptures of the drum by indirect force, and came to the following results. "While the perforations of the drum by indirect causes, as the result of air pressure in the external meatus, are usually located more or less toward the middle, near the lower end of the handle of the hammer, those resulting from blows on the head or fracture of the bone are often located near the border, so that there seems to be an actual detachment of the drum from the bony part." Pritchard[70]b has reported a case of fracture of the handle of the hammer by indirect force.

The literature of the last decade has been extraordinarily rich in extravasations into the drum. Among them should be mentioned a new form of multiple ringformed (the ring is not closed) hemorrhages into the drum, which Körner[71] has described. "On the grey, partially grey-red, background, these brownish red rings give a picture that easily reminds one of a panther's skin." It was a case of influenza otitis. The presence of extravasations into the drum and meatus has been reported by Tomka[72] in a case of acute otitis media accompaning the morbus maculosus Werlhofi, and by Sugar[13] in a case of recurrent purpura hemorrhagica; the latter considered these extravagations purpura eruptions.

The heretofore unobserved presence of true varices on the drum has been demonstrated by Rohrer[74]: There developed in a 7 year old boy, alternately on the right and left sides, in the membrana Schrapnelli and the superior posterior quadrant of the drum, numerous varices of the size of a grain of pepper and a small pea, which spontaneously disappeared, leaving a scar.

As to the primary inflammatory processes of the drum the repetition of a case, reported by me[75] from the Halle clinic, of interlamellary abscess of the drum seems to be justified, because in this case a ray of light has fallen on the ordinarily dark etiology of the abscess. The finding on the drum was as follows: Injection of the vessels of the manubrium mallei. A group of vessels ran from the processus brevis directly upward, and another upwards and backward. In the region of the umbo, were two prominences of the size of the head of a pin, which were yellow, tipped with a light reflex. A third prominence, smaller and not shining, lay somewhat higher, and in front of the handle of the hammer. On opening the small protuberances with the paracentesis needle, a drop of pus came from each, whose bacteriologic examination showed the presence of numerous streptococci.

The traumatic origin of the interlamellary abscesses was first suggested by Schwartze (Lehr. d. chir. Krankh. d. Ohres 1885 S. 119 and 120); he reported a case of interlamellary abscess which followed the application to the drum of a dilated solution of tincture of iodin, and a second case of abscess whose origin he refers to the application to the drum of a solution of 10 grains of silver nitrate.

In our case also, in all probability a trauma was the cause. The patient, while trying to free his ear from wax, injured his drum with a needle-like instrument; the lesion was probably the port of entrance of the streptococcal infection into the tissues of the drum.

Katz[76] has made us acquainted with the formation of spaces or cysts in the stria malleolaris. In longitudinal sections of the drum, he saw, with the lens magnification, a detachment of the cuticular layer from the subjacent propria, along the entire handle of the hammer. In this space large masses of leucocytes or fibrinous extravasations were found. This space formation, to which the large amount of subcutaneous tissue in this region predisposes, is considered by Katz to be the cause of the stria malleolaris becoming indistinct so rapidly in inflammatory processes on the drum.

That the persistence of perforations in the drum after the cessation of middle ear discharges is caused by the epidermis of the meatus growing over the border of the perforation, is shown by microscopic preparations which Politzer[77] demonstrated before the Third Austrian Otologic Congress.

Let us turn to the important findings concerning the pathologic anatomy of the middle ear that the last decade has produced.

A valuable work by Barnick[78] gives us a good view, especially of the microscopical details, of injuries of the middle ear in consequence of fractures of the temporal bone. These usually consist of hemorrhage, fracture of one or more walls, rupture of the drum, etc.

Stillkraut has given us a dissertation on the presence of hemorrhage in chronic nephritis.[79] He thinks that they are caused by disturbances in the nutrition of the vessel's walls, from which results a great permeability of the same.

We will mention only a few of the most noteworthy cases from the very rich literature on foreign bodies in the middle ear.

1. A case of Camerer[80], in which a blade of straw had passed through the Eustachian tube into the middle ear.
2. A case of Schmiegelow[81] in which a stone covered with earth was pressed into the middle ear by unskilfull efforts at extraction, resulting in a tetanus infection.
3. A case of Ostmann[82], in which a piece broken off from the point of a knife remained 12 years in the mastoid without any symptoms and had caused aural discharge only for a year.
4. A case of G. Trautmann[83], in which a cherry seed had been pressed into the pharyngeal end of the right tube.
5. A case of Ponthiere[84], in which the foreign body, a bent

piece of copper wire, 12 mm. long, had lain in the middle ear 16 years and had caused suppuration with polypus formation.

6. A case of Richter[85], in which a white piece of bone had lain 24 years in the ear, and had entered it by a malposition of a bony defect running from the external meatus into the antrum mastoideum.

7, A case of Haug[86], in which a plug of cotton was pushed too deep into a radically operated ear, and by means of a forceps or hook was thrust through a thin place on the floor of the middle ear along the tissue between the tuba Eustachii and the musculus levator palati mollis as far as the peritonsillar issue, where it came to a halt, and led to an abscess formation, from which the foreign body was extracted by an incision.

8. A case of Schade[87], in which the wandering of the foreign body was reversed, viz., from the mouth through the middle ear outward. The patient was a 19-year-old merchant, who had drawn out a bent nail from a cigar box with his teeth and accidentally swallowed it. It was not possible to extract the foreign body, and for eight days he suffered rather severely with his throat. Four days later, following a forcible movement, he experienced a severe pain in the left ear caused by a severe otitis media. Three days after the beginning of the pain in the ear, it was possible to remove the nail from the ear. It was 12 mm. long and 1 mm. thick, and bent at a right angle in the middle.

As to the acute otitis media, a case of Haug[88] shows that the exudate vesicles in acute catarrh are not always caused by a bulging of certain parts of the drum. In this case of influenza otitis upon which an autopsy was made, a serous exudate in the superior posterior part of the middle ear had emptied itself through the posterior fold, which was shut off by fresh membranous adhesion, into the drum, and after tearing the mucosa and substantia propria, had bulged the cutis out in the form of a large vesicle.

As to the pathologic anatomy of otitis media acuta suppurativa, our knowledge has been considerably increased in regard to the teat-like projections of the drum so often seen in this disease, especially in the posterior half, on whose summit frequently small granulations are observed. Bezold explains the e granulations as mucous membrane pressing out around the border of the perforation, which, according to Grünwald, is often covered with the mucous epithelium of the middle ear, or with the epidermis of the drum. Haug says they arise by hernia like prolapse of the mucosa through the small opening of the perforation, Katz[89], on the basis of his microscopic investigations, comes to conclusions differing considerably from the above authors. Whether this theory is good in all cases, or whether a variety of factors caused the formation of the bodies may be left unsettled. At any rate, Katz has given us a clear, positive anatomic finding, which is of more value than all speculative discussion, and therefore deserves to be reported in full. "If one examines microscropically a cross-section of such a tympanic prominence several interesting points will be observed. First, it is evident that it is a densely inflated granulation traversed by a narrow canal, and is covered with a greatly inflamed epidermis or rete, the whole taking its origin from the mucosa of the middle ear or the drum. Furthermore, the canal that lies within it is formed or lined bya layer of epithelium which is similar to that covering the granulation. This circumstance is explained by the examination of serial sections, which show that the tympanic epidermis has grown into the perforation opening. Furthermore, in addition to the epithelial-lined canal there is found within the tumor an excavation caused by the high pressure of the exudate. Finally, the upper layers of the epithelial covering of the tumor, which is in continuity with that of the external surface of the drum, show a considerable cornification, and between the lamellae at many places there are very plain pustules (nests of leucocytes). As to the etiologic factors of this cone-like body, the following are suggested by Katz:

1. A very narrow, high perforation.
2. A constant exudate in the middle ear.
3. Resistant tympanic epidermis.
4. Inversion of the epidermal border into the narrow perforation, making it still smaller.

The influence of these etiologic factors is very plausibly explained as follows: "In consequence of the irritation that the difficult passage of the thick pus exerts on the neighboring tympanic mucosa, there is set up a circumscribed granulation formation. This, in its further development, causes the adjacent substantia propria to disintegrate or become necrotic, but finds in the perforated but still resistant rete and epidermal layer an obstruction of such a character that the only possibility is for them to be pressed forwards like a hernia, and to grow with it, The small perforation can of course not be widened sufficiently, especially since the opening has been malplaced by the inversion of the epidermis. This inward misplacing of the opening easily explains the ability and the tendency of the leucocytes to press into the horny layer by way of the lymph channels in the reticular layer and the formation of pustules." Although Bezold[90] has lately agreed with Katz in regard to the anatomic explanation of that structure—above all in regard to the epithelial lining of the canal in the cone—he regards Katz's statement that the growths which are bare and those which are covered with epithelium are different kinds of structures, as superfluous and leading to error. We cannot agree with Bezold's view. We consider that the best way to obtain greater clearness in regard to the interesting tympanic cones is to get exact anatomic date concerning the individual kinds of those structures. From the variable results of the investigations of earlier authors, it seems probable that those bodies are not to be considered as unvarying in pathogenesis and structure.

I have already indicated the possibility that by the anatomic processes just mentioned, the ground is laid for the subsequent formation of the epithelial pearls in the drum. Whether these processes, when the acute suppuration does not heal, can also give rise to formation of cholesteatomata, and whether the origin of cholesteatomata in many cases of more medially lying perforations is to be ascribed to the same reason, can be shown only by further investigation.

The practical application of the above anatomic facts suggests itself.

First, as a prophylatic measure, we must prevent that factor, which with thick pus, predisposes to the formation of the cones, viz: small high perforations. We will accomplish this by dilatation of the narrow opening with the paracentesis knife, or with the galvanocautery. If such a tympanic cone has already formed, the danger of retention of pus constrains us to remove it. This can be accomplished with caustics and the cold snare only when we are dealing with bare granulation tissues, and not with that covered with epidermis. In the latter form, where there is a fistulous canal, lined with epidermis (Katz), these measures are often of no avail; in such cases good is accomplished by the galvanocaustic destruction of the cone.

The following may be mentioned as of peculiar individuality, from the anatomic investigation of the acute suppuration of the middle ear, during the last decade.

Katz[91]: A case of hypertrophy of the mucous membrane of the middle ear, with cone like growths of the mucous membrane around the round window, which had drawn the membrane outward.

R. Panse[92]: Path from the middle ear to the internal ear. Discharge of the pus through the annular ligament of the stapes above and below, partial destruction of the membrane of the round window, collection of pus at the base of the scala tympani, reaching in places to the bony spiral lamella. Thickening and infiltration of the wall of the utriculus with round cells; filling of the perilymphatic spaces of the semicircular canals with fibrin and round cells; both aqueducti contained pus, also. Membrana Reisneri destroyed, filling of the parts of the scalae lying near the modiolus with pus; the spiral ganglion canal permeated with round cells; the acusticus entirely suppurated, the facialis permeated with round cells but preserved.

Scheibe[93]. Progressive disease of the labyrinthine capsule consisting of necrosis, rarefying osteitis and softening of the bone. The perforation into the labyrinthine cavity took place at three places, at the posterior and the superior semicircular canals and at the superior and inferior borders of the stapedial annular ligiment. The perforation at the semicircular canal was caused by the rarefying osteitis, and at the oval window by necrosis.

As to the involvement of the mastoid in acute otitis media, I have already indicated how much our views have changed as to whether the mastoiditis accompanying the acute otitis of diabetes is primary or secondary. The characterization of the diabetes mastoiditis as primary has been almost universally abandoned. The same is true of the mastoiditis of influenza, in regard to which in 1894, Lemcke[94], Jansen and Körner (ibid) stated that the disease was especially located in the mastoid. The latter claimed that the disease was chiefly located where there was diploe, especially at the posterior border of the tip, and in the vicinity of the sinus transversus. Although Eulenstein (ibid) in regard to the view of Lemcke, makes use of the clinical fact that frequently after removal, by an operation, of the bony foci in the mastoid, the suppuration in the middle ear at once ceased, I can urge against this use the fact that the same experience is met in many cases where there is no doubt about the secondary nature of the disease of the bone. That Brieger's claim that a case observed by him was a primary disease, viz., an osteomyelitis of the mastoid, will not stand a searching criticism, I have already shown. Against his view, is the presence, however transitory, of a disease of the middle ear, which leads to the belief that it was a case of pneumococcus otitis. Unfortunately, the lack of a bacteriologic examination prevents an explanation of this case that is without objection.

So far no other author has had a case similar to Hessler's[95] case of "rarefying ostitis" of the mastoid, which followed an "otitis externa ex infectione", and which was microscopically characterized by brownish discoloration of the spongiosa, made brittle by decalification of the bone, and by complete absence of inflammatory changes on the mucous membrane of the mastoid cells.

Although Körner[96] wished to divide sharply the bone diseases complicating acute otitis media into "absorbing processes" and necrosis, it must be held against his view that there are frequently transitions between these two forms of the bone disease, and that frequently both processes go hand in hand.

As to the pathologic anatomy of the chronic middle ear suppuration, our knowledge during the past decade has been greatly increased in regard to a large number of points.

There has been a thorough investigation of the paths by which purulent inflammation of the middle ear passes over to the labyrinth. Among these work, as of first merit, must be mentioned that of R. Panse[97], the worth of which rests upon the exact microscopic examinations. Concerning the rarity of its presence, must be noted a case of Katz[98] who examined microscopically the path of the inflammation from the middle ear to the labyrinth. The mucous membrane of the promontory of this case was found necrotic at a circumscribed place. The bone subjacent thereto was destroyed by caries as far as to the endosteum of the cochlea. In the cochlea was a rich fibrinous exudate. In the case of Manasse's[99] the plate of the stapes furnished the path of the inflammation from the middle to the internal ear; granulations had grown through it, and the cochlea and the vestibular apparatus were filled with granulations and connective tissues, the auditory nerve was infiltrated with round cells, and its fibres separated by exudate.

Of the cases of chronic middle ear suppuration with interesting pathologic findings, we must mention those of Politzer[100], and Zeroni[101]. Politzer studied thoroughly the histologic changes in the mucous membrane in the chronic middle ear suppuration of childhood. He found chiefly papillary hypertrophy of the membrane, consisting entirely of round cells. The epithelium was cylindrical, ciliated, and much higher than the normal epithelium of the middle ear, and the latter was sometimes entirely filled out by the hypertrophied mucous membrane. In the neighboring bony spaces, Politzer found granulation tissue rich in blood vessels, and dilated medullary spaces in the hammer and anvil with similar contents. A direct connection of the latter with the diseased mucous membrane was not always demonstrable. Cystic structures lined with cylindrical epithelium and filled with epithelial cells, leucocytes, and detritus were found by Zeroni in the depths of the soft parts covering the labyrinthine walls of a specimen removed during a radical operation on a patient in Schwartze's clinic. He denied that they were glandular structures, and explained their origin by supposing that, by the hypertrophying of certain parts, certain normal remnants of the original epithelium had been pressed into the depths and there had developed into cysts.

As to the complication of the chronic suppuration of the middle ear, especially the involvement of the ossicles, the works of Grunert[102], J. Orne Green[103], Körner[104], Kretschmann[105], and Pritchard[106], have all confirmed what was previously reported by Schwartze and his pupils, (especially Ludewig), above all, the great frequency of the involvement of both outer ossicles in the general caries of the middle ear, furthermore the preponderance of the caries of the anvil over that of the hammer, and finally the correctness of the former assumption of the localization of the bone diseases on the individual parts of the ossicles. Although we have for a long time known clinically, through certain otoscopic findings after the middle ear suppuration, *e. g.*, cicatrices in the superior posterior part of the drum, through which the head of the stapes could be plainly seen, that caries of the ossicles can heal spontaneously, Kretschmann has given us the anatomical proof of true cicatrication of carious defects in five case, each time on the anvil.

A work of Brieger and Görke[107] gave us new conclusions in regard to the pathologic histology of the ossicles, which are so frequently diseased in the chronic middle ear suppuration.

Although we have heretofore spoken of caries of the ossicles, Brieger and Görke make the sharpest differentation between necrosis and caries. They especially mention the necrosis of inflammatory origin, which frequently accompanies extreme suppuration of the bony medulla. The sequestra are then usually only of microscopic size; rarely does it come to the formation of typical cloacæ and sequestra, as in osteomyelitis.

The inflammation is said to progress from the periosteum to the medullary spaces by way of the Haversian canals. They object to the view of Donalies[107], who considers that the chief etiologic factor of the bone disease is a disturbance in the access of blood to the bone, by compression of the blood vesse's by means of the lymph which has been extravasated into the perviascular lymph spaces. In addition to the possibility of the medullary involvement by way of the Haversian canals, an ulcer of the bone starting in the periosteum may work its way downward and directly open a medullary space. The periosteal foci, even when they involve the entire thickness of the compacta, may heal by cicatrization. Of importance, furthermore, is the proof that inflammatory processes in the middle ear may attack the medullary spaces of the ossicles, directly, with involvement or appreciable alteration of the perisoteum. We may thus have a central, medullary abscess, around which can form a considerable osteosclerotic thickening. Interesting, furthermore, is the statement in regard to the relative frequency of disease of the articular surfaces in middle ear tuberculosis; all stages were observed, exudate into the joint, deposit of fibrin on the cartilaginous surfaces, and even destruction of the bone. The joint was usually affected secondarily by neighboring foci, which spread along the surface. In only one case was a primary, isolated focus found and then it was on the articular surface of the anvil. The origin of hammer-anvil ankylosis from periarticular processes (Kretschmann) seems doubtful to the author. Furthermore, the author shows that hyperostotic thickenings of the ossicles are found without any trace of previous suppuration.

Of importance is a case reported by Katz[108] of rarefying ostitis of both external ossicula, in a one year old child, suffering with chronic otorrhea; the inflamed bone of these two ossicles, both of which showed normal contour, was traversed by numerous, large medullary spaces, in which were found a very cellular, young connective tissue, and numerous dilated blood vessels. According to Katz, the transition to a rarefying ostitis is very easy under predisposing conditions (tuberculosis, scrophulosis, syphilis, etc.), indeed, according to the author, the difference is only quantitative. This form of rarefying ostitis can, on the one side, lead to a disappearance of the bone, and on the other, to osteoplastic deposits (hyperostoses, exostoses, etc.).

An accidental finding by Hammerschlag[109] of a synostosis of the hammer-anvil articulation in the temporal bone of a 35-year old man is to be considered as the residuum of an isolated disease of the hammer-anvil articulation, since there was an absence of other symptoms pointing to a previous disease of the middle ear. The rarity of this histologic finding justifies its report. The microscopic examination showed that the hammer-anvil articulation had disappeared at one place. At this place, the ossicles were bound together by bridges of bone, which were of different breadth in different sections of the series, and which in places showed Haversian canals. Otherwise, the articular cavity at certain places, as well as a great part of the articular cartilage, was well retained. The mucous membrane of the middle ear was everywhere intact.

The anatomic proofs of the spontaneous curability of carious ossicles has given us views concerning the treatment which threatened to make the therapy by removal of carious ossicle valueless. It was thought that the spontaneous curability gave a right to adopt a more "conservative" therapy, and it was forgotten that the anatomically proven possibility of healing did not make a healing probable.

If one desires to adopt an exclusively palliative treatment, on account of the spontaneous power of healing, this can be done in the case of children and in cases of circumscribed caries of the long process of the anvil. Here a spontaneous cure is seen not so very seldom. But such a dangerous experiment must never be tried on adults or in fistulae above the short process, which indicates a caries of the head of the hammer, and suppuration in the attic.

We must never forget that, independent of the danger of the attic suppuration, the carious ossicles may form bands upon which the tympanic epidermis can grow into the middle ear, and thus the ground-work for a cholesteatoma can be laid.

To allow both external ossicles to remain in a radical operation, ostensibly in the interest of the auditory function—it has never been shown that in this way better functional results were obtained—has on closer study been shown to be superfluous and even a bluff, at times.

The past decade has given us some new conclusions as well as interesting facts concerning the pathologic anatomy of aural polypi.

Manasse[110] has given the proof of the presence of multinuclear giant cells in ear polypi (as many as 70 and more nuclei). They are mostly ring shaped, arranged around a focus of degenerated squamous epithelium, into which they send processes. Individual ones contain masses of epidermis or cholesterin tablets. Manasse explained them as foreign body giant cells, produced by the irritation of dead masses of epithelium or cholesterin crystals. A special type of arrangement of the nuclei is not recognizable. Manasse gives two possibilities for the entrance of masses of epidermis into the polyp; first that they "were detached by the inflammatory process going on in the connective tissue, surrounded by granulation tissue, cut off, and so killed;" and second, that the dead mass of epithelium, lying on the surface of the polyp was enclosed during the growth of these. The giant cells arise as well from one cell, as from the confluence of several. The cells of the granulation tissue give the material for their origin, but in one case, in which both giant cells and dead masses of epidermis lay in preformed spaces, it was given by the endothelium of the lymph vessels. The appearance of scales of epidermis in the lymph spaces, is explained by Manasse on the assumption that "comparatively wide lymph spaces end with open lumen on the surface of the polypi."

The same author has made us acquainted with mucous cysts in polypi, containing giant cells[111].

The cysts in the large polypi, lined with different kinds of epithelium, had arisen from involution of epithelium, by parts of the latter being cut off by the growth of the surrounding connective tissue. The epithelium continued to secrete mucus, so that the wall was stretched to a roundish shape. The giant cells found by Manasse in the cysts, sometimes showed a ound form, sometimes were found with protoplasmic processes. Manasse did not regard the giant cells as products of the cystic epithelium, but derived their origin from leucocytes, which he found in large numbers within the cyst.

To the frequently found, so-called cholesteatomata in the aural polypi, Zeroni[112] has added another finding, of value on account of the histologic examination of serial sections. He found the epithelium of the surface enormously hypertrophied, in such a way, that large irregular masses of it grew downward toward the center. These masses, in which numerous mitoses were found, became cornefied only in places, and so formed the structures mentioned. Other processes which can be seen on the same specimens, are interesting, and consist in the structures apparently disintegrating under the influence of giant cells. Zeroni considers the excessive hypertrophy of the squamous epithelium to be a process caused by inflammation, and thinks he is able to explain thereby, in many cases, the so-called primary cholesteatomata. Kümmel[113] does not consider such globular "cholesteatomata" to be cholesteatomata, but explains them as desquamated, visible foreign bodies of epithelial scales taken up by granulation tissue. The explanation of Kümmel cannot be used in the case of Zeroni's bodies, since the latter is an active growth of the squamous epithelium downward.

In a specimen demonstrated by Brieger[113], of a polyp that had grown out through the membrana Schrapnelli, there were found hairs, and around these, and partially incorporating them, were giant cells. Probably, the hairs, during an attic suppuration had entered through a high fistula into the recessus epitympanicus, and there had given the irritation for the formation of the granulations and the giant cells, in this case foreign body giant cells.

We must thank Görke[114] and Brühl[115] for extensive, systematic investigations on aural polypi.

Görke, on the basis of his investigation, considers the division of aural polypi into granulation tumors and mucous polypi to be the only histogenetically correct one. From these two fundamental forms, are derived all others, however much they differ histologically. He comes to the following conclusions:

1. The new formations of the sound conducting apparatus which are classed as "aural polypi" are of inflammatory origin.
2. According to their genesis, they are either granulation tumor or mucous polypi.
3. Consequently, in their structure, they show the histologic peculiarities of granulation tissue, or of the inflammatory-hyperplastic mucous membrane of the middle ear.

4. Processes of new formation of tissues are found in them.

5. In them appear the multiple products of regressive metamorphosis.

6. Of the latter, as peculiar to aural polypi and as of practical importance must be mentioned the "central cholesteatoma formation."

The work of Brühl reports on the use of the new methods of staining of 60 polypi.

Brühl insists that it is not the epithelial covering that characterises the polyp, but the ground substance, and divides aural polypi, according to their structure, into polypus granulation and fibroma.

Of interest is the comparative examination of cells which the author undertook upon aural polypi. Unna's plasma cells, which are often found in the polypus granulations, he considers to be large mononuclear leucocytes, the bodies of Russell, often found in polypi, he regards as derivatives of the large mononuclear leucocytes.

As to the other complications of the chronic suppuration of the middle ear, Bezold's belief that we must regard the hyperostosis of the temporal bone to be a protective wall against the propagation of the suppuration into the cavum cranii, has continually lost ground, and the view of Schwartze, which was abandoned years ago, that the hyperostosis favors the involvement of the cranial cavity by the suppuration, has been generally recognized as correct.

In this way Haug[116] expresses himself, and claims that as a result of the bony opposition to the periphery of the temporal bone with a simultaneous central absorption, i. e., an external condensing and internal rarefying ostitis, the condition for the propagation of the suppuration into the cranial cavity are much more favorab'e, in consequence of the pus being prevented from pointing outward by the the osteosclerosis. Lemcke (Berl. klin. Wochensch, 1893, No. 37) says the same. The correctness of this view is attested by the statistics of Okuneff[117], who found osteosclerosis in more than half of his case that died of chronic middle ear suppuration. As to the frequency of osteosclerosis, I[102] have demonstrated this complication 11 times in 113 cases of chronic caries of the temporal bone (10 per cent.), and 13 times in 96 cases of cholesteatomata (13.5 per cent.) .

I also reported a case where the antrum was entirely obliterated by new formation of bone, and the aditus ad antrum ended behind as a blind sac.

We must thank Schwartze for an interesting discussion on osteosclerosis of the temporal bone, especially in those cases in which there has developed an atresia of the meatus as a complication of deep suppuration of the middle ear, as a result of various kinds of traumata, but especially operative interference[118].

Schwartze, indeed, does not decide the question of the cause of the hyperostosis accompaning the atresia, or of the relationship between the two conditions, but inclines to the view that the tendency observed in atresia toward bony hypertrophy is probably the result of chronic dermal or periosteal irritation, caused by the stagnation of the secretion retained behind the stricture.

In regard to the carotid hemorrhages that appear as a rare complication of chronic middle ear suppuration, caused by erosion of the canalis caroticus by caries or cholesteatoma of the temporal bone, the following remarkable case has been reported by Zeroni[119].

The case was a man 29 years old who had died of pulmonary tuberculosis. The hemorrhage from the carotid, that took place shortly before his death, was stopped by tamponing. The post-mortem findings reported by Zeroni are as follows: "The wall of the carotid canal lying toward the middle ear shows a large hole. The top of the canal is entirely absent, and on cranial section, there is found in its place granulations infiltrated with pus. The carotis interna, in its entire course through the carotid canal, is surrounded by discolored, partly purulent masses of degenerated tissue. The wall of the artery is softened, infiltrated and discolored in its posterior and superior parts, corresponding to the holes found, but also extending somewhat beyond their borders. Some white nodules can be seen in the infiltrated parts. On the part of the arterial wall toward the middle ear, there is a perforation, the size of a pin; its position is about the place where the artery passes from its vertical to its horizontal course.''

Although not confirmed by histologic examination, the case according to the macroscopic picture, was one of caries tuberculosa and tuberculous affection of the carotid wall. The place of the arterial arrosion corresponds to Hessler's site of predilection, the convexity of the transition of the artery from the vertical to the horizontal course.

Zeroni explains the predilection toward perforation at this place by the fact that the vessel lies here nearest to the bony wall, and thus the danger of injuring the tube by a sequestrum caused by tuberculous disease is the greatest. Furthermore on account of the nearest approach of the vessel to the bone, the propagation of the bone disease over to the vessel coats take place here the easiest and the softening process in the vessel walls at this place has usually most widely progressed. In addition, the blood current most easily causes arrosion here, because the blood propelled by the action of the heart through the arterial system, naturally strikes the sharp curve of the carotid, whose convex side receives the greatest force.

A supplement to this case is the one of Heine[120], reported from Lucae's clinic, in which an arrosion of the carotid occurred as the consequence of a cholesteatoma of the temporal bone.

A case of Heermann[121], was one of a girl, 3 1-2 years old, with chronic otorrhea, who died of leptomeningitis. The postmortem showed caries of the promontory, a vestibule filled with pus and granulations and a defect in the floor of the middle ear. The carotis interna lay here free, surrounded by granulation tissue. On the side toward the middle ear was a small perforation in the wall of the carotid, through which a probe could be passed. The carotid throughout its canal, was surrounded by a purulent mass, its wall was discolored and very friable, and its lumen was filled with a thrombus, saturated with pus.

Jürgens[122] has reported two other cases.

In the first case, a recruit who had died of a diffuse purulent leptomeningitis, the right temporal bone was carious to a great extent, as though bitten out, saturated with pus, and discolored. The walls of the right carotid were necrotic to the extent of 2.5 cm. where they pass over into the horizontal portion. The walls were thickened, discolored and uneven. In the medial part of the artery was a fresh, non-suppurating thrombus.

The second was also one of a recruit who had died of a diffuse purulent, otogenous meningitis. The right os petrosum showed carious destruction to a considerable extent. The middle ear and the carotid canal formed a large, irregularly excavated cavity. The walls of the artery, in the bony canal, were entirely necrotic, not only at the knee but also almost the entire horizontal portion, almost to the point of the pyramid.

From the extensive literature of the last decade dealing with otogenous paralysis of the facial, we have selected only a few anatomical findings, that show the anatomic substratum of paralysis.

We have long known that in acute otitis media, with a complete filling of the middle ear with exudate, we may have a paralysis of the facial, probably by pressure of the exudate on the trunk of the nerve through a dehiscence in its canal. We must thank Panze[123] for an anatomic finding of this sort. He made serial sections through a temporal bone with acute "tympanitis." Several sections showed a hole in the wall of the canalis Fallopiae. The exudate filling the middle ear touched the perineurium, and in places even invaded the meshes of the fibrous tissue.

Grunert and Meier[124] had the opportunity of showing, in a case that came to postmortem, the anatomic substratum of artificial paralysis of the facial, which was caused by the attempt to remove a polypoid granulation from the facial prominence. The postmortem shows hemorrhages between the nerve fibres.

Of the greatest interest is a case of Buhe[125] from Schwartze's clinic, which shows us the anatomic substratum for a 35 year old facial paralysis. It was the temporal bone of a 35 year old suicide who had suffered from a paralysis of the facial since his first year.

The whole middle ear was filled with porous masses of bone. From the ganglion geniculi ran a very thin band of the facial, in about the normal position, above the promontory, while the main portion of the nerve, some millimeters below the ganglion geniculi, took a course directly across the middle ear, and ended in the bone of the lateral wall of the middle ear, above and in front of the drum. The lower part of the middle ear was also filled with spongy masses of bone and fibrous tissue. Only in two places were small cavities, which were filled with detritus, one at the mouth of the Eustachian tube, and the other beneath the second knee of the facial, at the region of the round window. The drum was not easily discoverable from within on account of fibrous adhesions. When the paracentesis was made, the needle went through the drum into the fibrous mass that filled out the lowest part of the middle ear. The osicles were entirely absent. When the facial was laid bare, from the direction of the base of brain, it could not be readily found in the mass of connective tissue, and only at its exit at the foramen stylomastoideum was it recognizable as a fibrous band that could be followed into the bone. Since the meatus, on account of the slight development of the processus mastoideus, lay close to the base of the brain, the piece from the exit to the second knee was very short. Just below the second knee, the main body of the facial diverged and ran directly upward toward the base of the brain to end blind in the bone, while a very thin remnant formed the band that continued along the normal course into the middle ear.

This dislocation of the facial, since an injury may be excluded on account of lack of operative interference, can be explained only on the supposition that an exfoliation of the bone, which took place according to the statement of the mother, not only completely tore the nerve trunk but also involved the end of the nerve.

Our knowledge of the pathology of the aural cholesteatomata has been in many ways increased during the last decade, but the question has not yet been settled.

That the earlier view of the pathologic anatomists, who considered cholesteatomata to be true new formations developed from misplaced cells of the ectoderm, is not correct in the majority of cases, but that on the contrary they are etiologically related to the ingrowth of the epidermis of the meatus or the skin, into a suppurating middle ear, which takes place under certain circumstances, was shown by Habermann two decades ago, but some aurists still hold to the other view.

A certain confusion has probably been caused in the entire cholesteatoma question by the application of the term "cholesteatoma" to the most heterogenous bodies, even to such as do not deserve such a designation.

Here belong the so-called cholesteatomata of the external meatus, which Habermann[126] described, and which correspond to the "masses of epidermis" of Hessler. Although Habermann, in contradiction, to Hessler, recognizes as an etiologic factor the chronic otorrhea which frequently precedes these bodies, and although their structure, growth and the ulceration of the bone hat frequently is caused by them bear a great resemblance to the characteristics of middle ear cholesteatomata, nevertheless we must deny to them the title "cholesteatomata" because they are not found in spaces that do not normally possess epidermis, but mucous membrane.

The so-called cholesteatoma in aural polypi (Habermann, Zeroni, Kümmel) the epithelial pearls of the drum, of unknown origin, as well as those arising in scars of the drum, (Habermann, Grunert) must also be considered, according to our view, as not belonging to the cholesteatomata.

There is no doubt that there are primary cholesteatomata of the temporal bone To the well known case of Lucae, a second has been added in the last decade.

This case of Schwartze[127] was that of a 41 year old man who died of phthisis pulmonum, who had an almost circular tumor, of the form of a biconvex lens (diameter 4.5 cm. by 1 to 1.5 cm. thick), in the squama of the right temporal bone, which reached into the pars petrosa and had ulcerated the squama outward and inward. Internally, the bone curved forward and touched the tumor. The tumor had a lamellated structure with a mother-of-pearl luster of the lamellae. The microscopic examination of the contents of the tumor showed the lamellated arrangement characteristic of the cornification products of the squamous epithelium. The tumor was surrounded by a mantle of connective tissue, poor in nuclei and in places slightly infiltrated with cells, whose inner surface was lined by several layers of squamous epithelium. In the lower half of the drum was a scar; the hammer, anvil and mucous membrane of the middle ear were normal. As to the pathogenesis of this tumor, it was probably due to a misplacement of squamous epithelium in the period of embryonal development, and the cholesteatoma developed after the analogy of the cholesteatomata observed on the membranes of the brain.

In the case of cholesteatoma verum in the posterior cranial fossa, reported by Körner[128] the temporal bone was affected secondarily by the tumor growing into the pneumatic middle ear spaces.

The literature shows beyond doubt that true primary aural cholesteatomata belong to the rarest of occurences.

Körner[96] in agreement with Kuhn, considers true cholesteatomata of the temporal bone (heteroplastic new formations whose anlage falls in the embryonal time) with secondary suppuration of the ear to be much more frequent than those which arise according to Habermann's idea, as secondary to chronic suppuration of the ear. The latter he calls pseudo-cholesteatomata or, with Wendt, otitis media desquamativa.

We cannot agree with this view which has been abandoned by Körner, and before him by almost every pathologic anatomist, because we have never found a cholesteatoma in the large number of 1 year old children operated on in Schwartz's clinic for mastoid, also never in those cases which were operated for undoubted acute mastoiditis. Although Körner, among other reasons for his view, says that in cases of "pseudocholesteatomata" the epidermal ingrowth "is accustomed to progress exceedingly slowly, and seldom leads to a collection of a considerable mass of epidermis" we can recall some cases of artificial cholesteatomata (published by Panse and Grunert from Schwartz's clinic) in which the first mastoid operation showed not a trace of cholesteatomata in the mastoid, while at the second a more or less considerable collection of cholesteatomatous masses was found. The greater or less amount of epidermal product depends, in our opinion, on the degree of the inflammatory process going on in the matrix (dermatitis hypertrophicans exfoliativa).

THE CHOLESTEATOMATA SECONDARY TO SUPPURATION OF THE EAR.

This includes the great majority of the so-called aural cholesteatomata. The designation "secondary" cholesteatomata can be replaced by cholesteatomata "developed extrauterine." The so-called primary, "true" cholesteatomata are to be designated as "of intrauterine origin." Both are the production of epidermis in parts of the ear that normally do not contain epidermis. The groundwork for this pathologic production of epidermis is, in the one case, the intrauterine migration of epidermis into the middle ear.

(a). Habermann's cholesteatomata.

Steinbrügge was the first to insist that, in addition to the migration of the epidermis into the suppurating middle ear (Habermann) a second factor was necessary, viz,, the inflammation of the new lining of the middle ear. While Steinbrügge thought that the irritation leading to the inflammation of the migrated epidermal lining took place in the lower layers of the epidermis, Haug[129] claimed that the irritation of the pus, that was prevented from escaping, acted on the surface of the migrated epidermis. It macerated the superficial epithelial layers and since the organism attempted to free itself from dead cellular elements, the subjacent epithelial layers were made to proliferate, but were pressed upon by the old layers lying on them and by the masses of secretion, and being pressed back, in their turn became a source of irritation to the following layers. He called this procedure the strife of the epithelium with its offspring.

The roll played by caries of the ossicles in the pathogenesis of the aural cholesteatomata was first pointed by us[102]. The ossicles sometimes form the bridge over which the epidermis enters the middle ear, in cases of high perforations. While Jansen[130] had mentioned the frequency with which cholesteatomata of the middle ear are accompanied by fistulae into the bony, horizontal semicircular canal, which comes about through pressure ulceration, and which often leave the membranous semicircular canal intact, we (l. c.) insisted that in this way cholesteatomata could enter the internal ear. The fistulae allow one to think of the possibility that in certain cases they may be caused by caries, and that the epithelium of membranous semicircular canal in this way can get into the middle ear and cause the formation of cholesteatomata.

The old view of Kirchner, in regard to the growth of a cholesteatomata, and the origin of the ulceration of the bone, that it was caused by an active growth into the Haversian canals, has lately been proven erroneous by Katz (l. c).

Siebenmann considers the bony rarification under the matrix in cholesteatoma at those places where there are epidermized plates of bone—e.g., the walls of the pneumatic cells in the mastoid—to be analogous to atrophy of the turbinates in ozena. "It seems that the physiologic balance between apposition and resorption is more disturbed at those places where the supply of blood must come from a metaplastic region. It is possible that these vessels suffer greater changes than the few contradicting investigations lead us to suppose."

The spontaneous cure of cholesteatomata has been repeatedly observed. We[102] have shown the fact, hitherto unknown, of the spontaneous cure by calcification of the matrix.

(B) CHOLESTEATOMATA CAUSED BY METAPLASIA OF THE MUCOUS MEMBRANE OF THE MIDDLE EAR.

Before Habermann had shown that the majority of cholesteatomata are caused by the migration of the epidermis of the external into the middle ear, aurists shared in the belief of v. Tröltsch and Wendt in regard to the pathogenesis of of cholesteatoma. They claimed that the matrix of the cholesteatoma arose by a metaplasia of the epithelium of the middle ear's mucous membrane into squamous epithelium, and v. Tröltsch thought that this took place as a result of the irritation and pressure of the stagnant cheesy pus, while Wendt thought it was the result of unknown external causes, which acted on the mucous membrane through the perforated drum.

Although since Habermann's explanation, we have almost entirely given up the view of v. Tröltsch-Wendt, the last decade has given us some anatomic findings that force us to take that into consideration in certain cases of cholesteatomata.

Politzer[132] has demonstrated that pathologic mucous membrane of the middle ear may undergo an epidermic transformation, which can cause the formation of a cholesteatoma. He possesses a specimen of a smooth cholesteatoma, size of a bean, in the upper part of the middle ear cavity, which took its origin from an obstructed and dilated cyst of the mucous membrane. According to Morf[133], a direct metaplasia of the epithelium of the mucous membrane into the epidermal matrix of a cholesteatoma was observed in Siebenmann's clinic.

The case reported by Dreyfus[134] from the same clinic, of severe tuberculosis of the middle ear that ended in a cholesteatoma, where there arose "the cholesteatoma matrix, with a superficial epidermal layer, in the bony cavity, which was covered by an epidemis membrane, by a change of the most superficial layers of the bone scar in consequence of metaplasia of tissue," cannot be explained in this manner, because it was not a case of metaplasia of the epithelium of mucous membrane into epidermis.

(c) THE CHOLESTEATOMA OF LEUTERT[135].

They have a peculiar position as the connecting link between true tumors and Habermann's cholesteatomata, in so far as they are true retention tumors, which have arisen on the basis of epidermis which has migrated into the suppurating middle ear.

Leutert (l. c.) suggests that the epidermis that has grown into the middle ear is able to cause cholesteatomata not only by over production of epidermal products on an inflammatory basis, but also by actual tumor formation, by forming of retention cysts.

His cholesteatomata form a completely closed sac, and consist of three layers, an external, connective tissue, a middle, squamous epithelium and a central product of cornification of the latter. These retention cysts arise from epidermis which has been severed from its connection either by inflammatory processes or by operative procedures, and has grown into a closed sac, according to the character of a traumatic epithelium cyst. The presence of such very small cholesteatomata, which grow by the accumulation of the products of cornification within them, and without the presence of inflammation, on the long process of the anvil, in connection with centrally lying perforations, and without an epidermal path leading to them, causes Leutert to assume a further possibility for the origin of this kind of cholesteatoma, viz. the transplantation of pieces of epidermis from the drum into the granulation tissue lying behind it by means of instruments, etc. The growth of these implanted pieces of epidermis takes place exactly analogous to that of traumatic epithelial cysts, and the processes in Kaufmann's encatarrhaphia.

While we have just shown that the study of the pathogenesis of cholesteatomata has received, during the last decade, an appreciable widening and deepening, the same space of time has brought us a large number of remarkable cases

Hugel[136] reported a case in which the formation of a cholesteatoma continued in the middle ear in spite of the cicatrization of the drum.

I have seen a similar case in our clinic. In a case where there was a differential diagnosis to be made between abscess or gummi in the temporal lobe, on the grounds of the cicatrication and calcification of the drum, I diagnosed the latter, but the autopsy showed an otitic abscess of the temporal lobe caused by a cholesteatoma in the recessus epitympanicus.

In regard to the spreading of the cholesteatoma, the following are of interest.

Grunert and Meier[124] reported a case in which the autopsy showed an extensive cholesteatomatous focus in the region of the apex of the os petrosum to be the cause of the continuance of a suppuration after the complete cure of a large cholesteatoma of the middle ear.

I[102] reported a case of a cholesteatoma, the size of a cherry, under the surface of the bony inferior wall of the meatus, and a second one, in which the cholesteatoma, after destroying a large part of the anterior bony wall of the meatus, had pressed into the fossa glenoidalis of the lower jaw. Kretschmann[137] reported a case of arrosion of the wall of the sinus sigmoideus by the mechanical pressure of a cholesteatoma.

In the case of Lubet-Barbon[138], the temporal bone was changed into a cholesteatomatous cavity of the size of a hen's egg, which was surrounded only by a soft shell, accompanied by complete disappearance of the bone beneath the dura, sigmoid sinus, and periosteum.

In the case of Haug[139] the cholesteatomatous masses had pressed up to the lateral ventricle. The whole middle ear was filled with the cholesteatoma. Just at the sinus sigmoideus, which was filled with a thrombus, the dura was perforated to the size of a pfennig, and the vicinity of the perforation was greyish green discolored. The bare surface of the brain was greyish green discolored, and in an area of the size of a 20-pfennig piece, was eaten out by the cholesteatomatous masses that had broken through. From this area, the semisolid cholesteatoma, in places mixed with blood, and surrounded by softened masses of brain substance, extended to the left hemisphere of the cerebrum between the gyrus fusiformis, hippocampi, gyrus lingualis, along the interstices of the vessels, i. e., between the temporal and occipital lobes, into the inferior and posterior brain. In the lateral ventricle was a foreign body consisting of masses of cholesteatoma.

Finally, we must mention a case of Barnick,[140] in which a cholesteatoma of the mastoid was changed into a cyst containing blood. This change was caused by a hemorrhage from the arroded sinus or a large bone vessel into the cholesteatoma cavity.

In concluding the findings of the last decade concerning the bone complications of otitis media suppurativa chronica, we must mention, on account of its rarity, a case published by Sonntag,[141] of the residues of chronic suppuration.

"After the removal of the normal tegmen tympani, the head of the hammer and the body of the anvil appeared in the attic in the normal manner; there was lacking, however, the connective tissue connection between the head and the body of the anvil. These were firmly bound together by bony tissue. A shallow furrow was the only indication of the joint between the two bones. From the hammer-anvil body a broad bridge of bone, perforated by a point-like opening, ran to the mesial wall of the middle ear. The anterior wall and the anterior part of the mesial wall of the middle ear were connected with the above bony bridge and the neck of the hammer by a broad band of bone, which passed upward in a continual mass of bone, in which the handle of the hammer and long process of the anvil seemed to be enclosed. These broad bridges of bone prevented a further investigation of the middle ear from above". After the middle ear was opened f om below, "a mass of bone was seen which occupied the entire breadth of the middle ear except a small hole Neither in the bone nor in the cavity were there to be found single items such as the end of the long process of the hammer, the stapes, the cochlear window, or the promontory. The impression was given that the entire over-half of the middle ear was filled out with one mass of bone and that out of this the head of the hammer and the body of the anvil were the only things that projected in unchanged form. The mucous membrane that covered the mass of bone was thickened." As the mesial bar of the normal meatus there was found, instead of the drum, a bony plate of the size and position of the drum which in its anterior inferior quadrant was perforated by a small hole. A straw introduced into this hole appeared in the middle ear just before and beneath the head of the hammer. While the pars externa of the attic had remained free from the new formation of bone, that which filled out the lower half of the middle ear extended in one mass from the region of the wall of the promontory to the plate of bone which closed off the meatus. No new formation of bone was found in the rest of the middle ear.

If we turn to the findings of the last decade concerning tumors of the middle ear, we must say at the outset that the discussion of polypi and the cholesteatomata that are not to be included in the true neoplasms has already taken place, because we must give them a special classification as opposed to tumors of the middle ear, on practical grounds if not theoretical.

To characterize the findings of the last decade in a few words, they consist of new conclusions in regard to the pathogenesis of carcinoma of the middle ear, drawn from a rich material, in addition to the report of the presence of a chloroma in the temporal bone, which had not been observed before.

As to the most important of the conclusions in regard to primary carcinoma of the middle ear, the greatest attention must be paid to a work of Zeroni[142], who has worked over this subject by the aid of the special literature and a number of aural carcinomata at Schwartze's clinic.

He emphasizes the etiologic relation between chronic suppuration of the middle ear and primary carcinoma of the middle ear. The fact that those cancers which certainly take their origin from the middle ear are all squamous epithelium cancers. while in the normal ear there is no squamous epithelium, he explains by migration of squamous epithelium into the middle ear in cases of chronic suppuration just as it is antecedent to the formation of a cholesteatoma. By convincing arguments he repudiates the hypothesis of metaplasia of the cylindrical epithelium of the middle ear which has been proposed, as well as the hypothesis of abnormal development of germinal tissue as the point of origin of the primary carcinoma of the middle ear. Likewise he refutes the theory of Kretschmann and Kuhn, that the cancer possibly comes from aural polypi with many layers of epidermis, by pointing to the histological differences between malignant, atypical epithelial carcinomata and the benign, atypical epithelial growths, which are frequently found in aural polypi, in chronic suppuration of the middle ear. Furthermore, he describes the secondary changes brought about in the different parts of the temporal bone by the growing tumor. A part of the bone is caused to disappear by the direct pressure on it, and a part is made necrotic, with the formation of sequestra, by disturbances of circulation in the bone. The sites of predilection of bone destruction are the walls of the meatus, the temporal squama, the tegmen antri and tympani; on the other hand, as especially resistant he mentions the hard, bony parts of the pyramid, and especially the cochlea. Finally, he describes the varying power of resistance of the dura to cancer, as well as the destruction of the lateral wall of the sigmoid sinus, and the extension of the tumor into the sinus, which almost invariably takes place.

We must here refer to one of his cases (from Schwartze's clinic), although it was a case of carcinoma of the concha and not of the middle ear. The infiltrated lymph nodes in the vicinity showed a tuberculous disease instead of a carcinomatous. The carcinomatous ulceration must have been the place of entry of the tubercle bacilli; they were then taken up by the lymph nodes, and a local tuberculosis of lymph nodes was caused. In this case we have a new example of the falseness of the belief in the antagonism between carcicinoma and tuberculosis, which was formerly accepted.

In the cases of squamous epithelium cancer of the middle ear of Sturm[143], from Körner's clinic, and of Alexander[144], the carcinoma likewise arose on the basis of a chronic suppuration of the middle ear. In both cases the squamous epithelium that laid the groundwork for the cancer had grown into the middle ear from the external meatus, in Sturm's case through a fistula in the superior posterior wall of the meatus. In both cases, the origin of the carcinoma is analogous to the origin of squamous epithelium cancer in old bony fistulae, which according to v. Volkman arise from the epidermis of the skin that gradually grows into the fistula. We might mention another point common to the squamous epithelium cancers which arise on a basis of chronic suppuration of the middle ear and Volkmann's carcinomata in old bony fistulae; viz., both show a relatively slow growth and scant tendency toward metastasis.

In Sturm's case, the carcinoma had completely grown through the temporal bone and had extended to the middle and posterior cranial fossae, the labyrinth and the fossa glenoidalis. In the horizontal part of the sinus transversus was a gray softened thrombus, while the entire vertical part was involved in the tumor.

As to the individual cases, we must mention, on account of its rarity, a case of chloroma of the temporal bone which was observed by Körner[145], and historically examined by Lubarsch[146].

The case was in a 6-year-old boy with multiple chloromata, in part symmetric, of the dura mater, the sinus transversi, the middle ear, the orbit, the temporal musculature, and with subepicardial and subpleural hemorrhages, hemorrhages into the lungs, dilatation of the ventricles of the heart, general anemia, and hypertrophy of different lymph nodes, especially those of the neck. The histologic examination showed that the majority of the cells were of the lymphocyte type, and the Biondi stain showed a fine fibrous reticulum. As a whole, the histologic structure agreed with the reports of other authors as to the minute structure of chloroma. We must especially mention certain structures found in the new formations in the ear, the sinus transversi and the dura; (1) large round cells, with two vesicular nuclei; (2) cells with 4 to 5 nuclei "that might be called giant cells." The chloroma was partially in nodular form, and partially of a more diffuse, infiltrating form, as, e. g., in the bones of the cranium, in the musculus temporalis, and in the orbit. As to the location of the tumor in the ear, the middle ear was entirely free, while tumor masses were found in the mastoid, the subjacent bone of which in places showed a beautiful osteoplastic layer, and in others Howslip's lacunae with osteoclasts. The acusticus was imbedded in a tumor mass, which, however, reached only to the perineurium. Likewise there was partial degeneration of the nerve fibres (Weigert's stain for medullary substance). Lubarsch, in agreement with v. Recklinghausen, classes chloroma among the leukemic and pseudoleukemic lymphomata and thinks it very probable that in the etiology of lymphosarcomatosis and kindred diseases, an important role is played by the tubercle bacilli and their toxines.

Among the cases of carcinomata reported in the last decade, the following deserve notice:

1. The case of Krepuska[147]. The tumor arose from the glandulae ceruminiferae and extended as far as the middle ear. The hammer was changed into a connective tissue structure, bare of bony elements, and filled with cancer nests; the anvil, completely imbedded in the cancer, showed only in places, on its mucous coat, a carcinomatous degeneration.

2. The case of Haug[148]. The primary seat of the endothelial cancer was in the middle ear. From here, the tumor

had grown downward and inward along the tube, and upward along the hiatus subarcuatus. In contrast to the usual tendency of cancer to break through everything the new formation had advanced along the performed routes, without at first attacking the bony walls; only later when the latter were so much compressed that they could no longer allow expansion, was the bone itself affected; on the base of the brain the tumor had advanced as far as the foramen jugulare and the anterior condyloid foramen. It is interesting to note the length of time that elapsed—at least 4 years—before death, which took place from a terminal meningitis.

3. A case of Schwabach of a squamous epithelium cancer. The seat was in the sphenoid, but it extended over a large area of the base of the brain, and had secondarily attacked the middle ear, into which it had grown in the form of a cone like projection of the floor of the middle ear, lying in front of the niche of the round window. The exact histologic finding was as follows: "The bone of the promontory was intact. The mucous membrane of the middle ear over the tegmen tympani was partially carcinomatous infiltrated; partly entirely destroyed. That of the labyrinth wall was for the most part well retained, even the epithelium being unaltered. The mucous membrane over the promontory showed new formations, and the changes can be followed from here, in front of the niche of the round window, to the floor of the middle ear, where the affection of the mucous membrane is the plainest. From the promontory, the tumor has grown into the middle ear in the form of a cone, and in places fills the entire space as far as the drum. The niches of the round and oval windows are likewise almost entirely filled with this growth, and the ossicles are imbedded in it with the exception of the head of the hammer and a part of the manubrium. This is especially true of the stapes-anvil articulation and the bars of the stapes. The drum is for the most part unaltered, showing only a thickening of its layers, but is not attacked by the carcinoma except at a small place at the superior posterior part, where the tumor had pierced the drum and grown into the meatus, without attacking the walls of the latter. In the cellular spaces of the mastoid is a rather rich fibrino-purulent exudate. The upper wall of the Fallopian canal is destroyed by the tumor, but

the sheath of the facial nerve is completely intact. Likewise, the nerve fibres are seen to be free from pathologic changes both here and throughout the entire course in the temporal bone.

NOTEWORTHY CASES OF SARCOMA.

1. A case of Haug[150]. Melanotic giant celled sarcoma of the meatus, middle ear, and the pars squamosa of the temporal bone which had started in the periosteum of the middle ear.
2. Story[151]. Sarcoma of the middle ear, which appeared under the form of an ear polyp, which quickly returned after removal.
3. Ash[152]. Case of myxosarcoma, melanosarcoma and myelosarcoma of both mastoids, with multiple foci elsewhere.
4. Grunert[153] (Schwartze's clinic). Case of sarcoma of the base of the skull in a three-year-old girl, with perforation of both pterygoid processes of the sphenoid, extension to the temporal bone, the right orbit, metastases with destruction of the bony substance of both frontal eminences.
5. Kirchner[154]. Myelogenous sarcoma in a man, aged 40 years, starting from the cells of the processus mastoideus. It possessed the peculiarity that the spindle cells of the sarcoma grouped themselves in concentric layers around the large cells of the medulla of the bone, forming a structure that recalled a cholesteatoma.
6. Kuhn[155]. Myxosarcoma, which took its origin from the connective tissue on the labyrinthine wall, where myxomatous tissue is found in the new born, and frequently in the first months of life. The soft, greyish red tumor, of the size of a nut, had grown out of the middle ear as far as the external opening of the ear, beyond which it protruded, had perforated the lower wall of the meatus to a considerable extent, was lobulated at its peripheral end, and extended as far as the insertion of the m. sternocleidomastoid (just under a suppurating fistula in the skin over the tip of the mastoid). The mastoid was free from pus and tumor masses. Death of the 1-year-old child, five months after the first appearance of the tumor, of marasmus.

7. Friederich[156]. A sarcoma arising from the dura and involving the middle ear.

8. Schmeden[157]. A small alveolar sarcoma, which had involved the pars pyramida—except the labyrinth—and the mastoid. The entire bulbus venae jugularis was likewise affected and obliterated. In the region of the fossa jugularis, the tumor was as large as a walnut, and superiorly it had grown through the foramen jugularis into the cranial cavity, to the size of a large hazelnut.

9. Hegener[158] (Heidelberg clinic). A case of alveolar endothelioma of the right temporal bone, in a boy three years old, which possibly started in the dural covering. The endothelium of the lymph and blood vessel as well as the connective tissue had taken part in the new formation.

Second case. Alveolar melanosarcoma of the right ear in a woman, aged 44, the origin of which likewise could not be determined with certainty.

OTHER TUMORS.

Eschweiler[156]. A case of fibromyxoma of the mastoid; a pedicled tumor of the size of a small egg, which, as well as a part of a cavity formed by antrum, middle ear and bony meatus, was covered with epidermis.

Haug[160]. A case of gummi of the mastoid region, which developed 8 years after the luetic infection.

Moure[161]. A cavernous angioma, arising from the middle ear. The central cavity was the size of a small hazelnut. The external surface of the tumor consisted of stratified squamous epithelium, with a rete Malpighi below, and well developed papillae in places. Then came a thin layer of connective tissue. This was partly succeeded by irregularly arranged islands of long, dense connective tissue, and partly by an unmistakable cavernous tissue.

Green[162]. A case of osteoma. A lobulated tumor of 15.11 mm. arising from the middle ear, and referred by the author to a remnant of fetal cartilage. Histologically, the periphery of the tumor showed a thin layer of cartilage, which was absent only at the point of insertion, where there was a small pedicle. Under this was a thin layer of compact bone, and under this spongy bone.

Jansen[163]. A hard knobby tumor of the size of a pea, which had destroyed the inner surface of the superior posterior quadrant of the drum, otherwise intact, of a woman 40 years old. There was a striking similarity to the structure of the thyroid gland—areas of cubical epithelium with an alveolar structure and formations of cysts, with colloid substance in the cysts. Nevertheless in the discussion that followed the demonstration, the tumor was regarded as an adenoma and not a misplaced struma.

We have already referred to a portion of the findings of the last decade in regard to tuberculosis of the middle ear, in the general part of this discussion.

Thanks to the pioneer workers, especially Habermann, the pathologic anatomy and general pathology of middle ear tuberculosis is more thoroughly known. Barnick has shown from the material in Habermann's clinic that the tuberculosis of the ear may be caused by a hematogenous infection, as well as the usual method of infection by way of the Eustachian tube, and that there are two forms of tuberculosis of the ear, an acute and a chronic, which must be differentiated. There are still many questions to be solved, e. g., whether in the hematogenous infection, the first development of the tubercle bacilli takes place in the mucous membrane or the bone.

While Körner[96] has lately attempted to differentiate clinically the tuberculosis of the temporal bone, having different origins and courses, we think that the anatomic investigations would also be more valuable, if they would be classed more than they are under the clinical pictures, the more so as certain anatomic groups actually are in accordance with the corresponding clinical types.

Körner's division is as follows: (1) tuberculous suppuration of the ear and temporal bone in the end stages of tuberculosis of the lungs; (2) tuberculous suppuration of the ear and temporal bone where the pulmonary tuberculosis is stationary; (3) tuberculous suppuration of the ear and temporal bone preceding the tuberculosis of the lung; (4) a typical tuberculous suppuration of the ear and tuberculosis of the temporal bone; (5) tuberculous infection of the middle ear and the temporal bone by way of the tube, arising from a pre-existing tuberculosis of the nose; (6) tuberculosis of the temporal bone by infection via the blood stream; (7) tumor form of tuberculosis of the ear and temporal bone.

There is, as yet, no agreement among specialists, as to the answer to the elementary questions, how often suppurations of the middle ear are of tuberculous nature, and how often a suppurating middle ear is to be regarded only as the port of entrance of a tubercular secondary infection.

In regard to the first of these questions especially, authorities are exactly opposed to each other. The surgeons frequently maintain that the chronic suppurations of the middle ear in the majority of cases have a specific tuberculous basis; on the other hand, the influence of tuberculosis in causing suppuration of the middle ear is minimized by some. That the investigations, hitherto carried on to solve this question, have not yet produced incontrovertible results, is due as much to the fact that the number of investigations at our disposal is still too small to settle it, as to the fact that usually the investigator has confined himself to the bacteriologic examination of the aural discharge, the negative result of which is no proof that it is not a case of tuberculosis.

Under the circumstances, all new, correct statistics are of value.

Brieger[146] found in 241 patients that died of tuberculosis, 37 times chronic inflammatory processes in the ear, whose tuberculous nature he was able to demonstrate 18 times. In 7 cases the tubercular process had attacked the labyrinth; the perforation from the middle ear took place 3 times through the round, twice through the oval, and twice through both windows.

Garbini and Ballistreri[165], in 40 cases of chronic suppuration of the middle ear and caries, could demonstrate 4 times the tubercular nature of the disease by means of bacteriologic examination and experiments on animals.

Körner[166]. A case of tuberculosis of the temporal bone, in which the thickened dura mater, covered with granulations, lay bare over the destroyed tegmen tympani. The granulations contained pieces of bone; the dura, as well as an adhering piece of brain substance was permeated by caseated tubercle nodules.

Hanel[167]. A case of beginning perforation of both windows of the labyrinth in caries tuberculosa of the middle ear. The invasion of the labyrinth by tubercular disease took place at both windows. "The periosteal inner layer was laid bare at the round window by caries of the bone, in such a way that the fibres of the membrane of the window had lost their insertion in the carious bone, and thus nothing was in the way of the granulation tissue growing under the endothelium of the membrane of the window and the periosteum of the labyrinth." "In the anterior, inferior periphery of the oval window, however, the comparatively thin ligamentum annulare was itself destroyed by the caseation that had advanced over the surface. Here the thickened endothelium layer of the ligament still offered obstacle to the process, so that there was really no perforation with free communication between the perilymphatic space and the middle ear."

Grunert and Meier (l. c.), A case of tubercular panotitis, from Schwartze's clinic. in a two year old child. Even the macroscopic findings gave the diagnosis of tubercular disease, which was confirmed by the microscopic examination (tubercles in the granulation tissue, tubercle bacilli in the aural discharge). The mouth of the external meatus was widened by ulceration (11.9 mm.). Anteriorly, the ulceration, which had destroyed the tragus, passes over into an ulcer of the skin, 3, 5:1.3 cm. in size, with undermined margins. The ear was changed into a cloacum the size of a pigeon's egg. None of the membranous meatus was to be seen, and of the bony walls, the anterior and posterior were entirely destroyed, and the superior and inferior were almost entirely so. None of the anterior attic wall remained. Posteriorly, all of the processes mastoideus was lacking except the tip, so that the posterior wall of the cavity was formed by a portion of the sinus transversus 2 cm. long. A part of the Fallopian canal was found in a bony sequestrum. The macerated temporal bone showed, futhermore, a large defect which started in the labyrinthine wall, in the region of the oval window that was suppurating and carious, crossed the entire pyramid of the temporal bone in an oblique direction, and joined with the meatus internus. Furthermore there was an extensive carious erosion of the posterior semicircular canal throughout its entire extent.

Barnick[168]. A case of acute tuberculosis of the middle ear in a female aged 32—7 weeks from the beginning of the ear affection to exitus lethalis. There was a "high degree of diffuse edema and infiltration of the mucous membrane of the bony tube and middle ear. On the lateral wall of the labyrinth was a superficial ulceration and caseation of the mucosa, while in the deeper layer were well characterised miliary tubercles with giant cells. The bony walls of the middle ear were not affected. Both membranes were entirely destroyed. Labyrinth intact."

The histologic findings in a case of a woman aged 20, who died of chronic tuberculosis of the middle ear were as follows: " In the bony part of the tube, as well as in the part of the middle ear near its mouth, a superficial caseation of the mucous membrane with numerous miliary foci and characteristic giant cells in the deeper layers were found. The mucosa of the attic, the antrum, and the internal and inferior walls of of the tympanic cavity were completely caseated, and the adjacent bone was partially eroded. The long process and the body of the anvil, the manubrium mallei and the anterior crus of the stapes were carious, and the latter was fractured by granulation tissue, containing tubercles. The tubercular growth had completely destroyed both labyrinthine windows, although there was nowhere a perforation, but there would certainly have been one in a short time at the posterior inferior border of the body of the stapes. The facial canal was likewise arroded over the oval window, and its sheath was inflammatorily thickened. The labyrinth was free from all signs of inflammation."

Piffl[169]. An interesting anatomic finding of otitis tuberculosa, with tumor like protuberance into the cranial cavity, from the pathologico-anatomic institute of Prof. Chiari at Prag. Extensive tubercular destruction, which had extended by several paths from the middle ear into the internal ear. The disease finally passed over into the cranial cavity, caused a pachymeningitis externa tuberculosa, and then a reactive inflammation of the dura mater over the attic, which lead to a tumor like thickening of the same. "In the angle between the superior surface of the pars petrosa and the internal surface of the pars squamosa, was found the main mass of a ' tumor'' larger than a walnut, whose surface was covered with a large number of nodules varying in size from a millet seed to a hemp seed.'' This tumor belonged exclusively to the dura. Similar large tumor-like thickening of the dura on the posterior surface of the petrous pyramid, tumors in places 2 cm. thick, growing around and obliterating the sigmoid sinus, obliteration of the bulbus venae jugularis. The tubercular nature of the tumor masses was confirmed by histologic examination (tubercles, central caseation, giant cells, tubercle bacilli).

Warnecke[170]. A case of cholesteatoma with tuberculoma of the cerebellum and meningitis tuberculosa. It was not shown in this case whether the diseased ear was the point of entrance of the tubercular infection of the cranial contents or not.

Haike[171]. A case of isolated caries tuberculosa of the labyrinth wall in a patient that did not show tuberculosis clinically.

Bär[172]. The results of the histologic examinations of tubercular granulation-tumors, in two cases from the ear clinic at Strassburg.

The granulation taken from a retroauricular abscess cavity showed the histologic structure of tubercular granulation-tumors, the so-called granuloma. The same appearance was given by the aural polypi present. The latter were probably ordinary polypi, that had secondarily become infected by tuberculosis.

Liaras[173]. A case of lupus of the middle ear, in which a proliferation of connective tissue caused a complete obliteration of the middle ear and the Eustachian tube.

In regard to no portion of the pathologic anatomy of the middle ear have our views undergone such a radical change in the last decade as in regard to the so-called sclerosis of the middle ear.

Although a decade ago, the middle ear sclerosis of the so-called dry chronic catarrh was a very vague conception under which were grouped pathologic conditions of the most varied anatomic basis, at the present time, thanks to the labors of

Politzer, Bezold, Panze, Habermann, Ed. Hartmann, Siebenmann, and Katz, the pathologic anatomy of that disease has been so well determined, that we know the anatomic conditions characteristic of it. It is true that the relationship of the findings to the pathogenesis is still in dispute, and the future must make this clear. The work necessary for this must chiefly consist in clinical observations; less can be expected in this connection from anatomic investigations. It is especially necessary to construct the family trees of otosclerotics, and to give the most careful attention to the constitutional conditions of the individual members.

No better review of the pathologic anatomy of sclerosis can be given than by reporting in a historical form the different steps by which our knowledge has advanced.

Although for decades through the anatomic investigations of Toynbee, v. Tröltsch and Schwartze, we have known the important pathologic changes that underlie the well known clinical symptom-complex of sclerosis, e. g., the new formation of bone in the region of the labyrinthine windows leading to ankylosis of the stapes, the greatest stress was laid on the chronic inflammatory changes in the mucous membrane of the middle ear. Politzer[174] was the first to break away from this view, and, on the basis of 16 cases anatomically examined, claimed that there was a circumscribed, primary disease of the bony labyrinth capsule in the region of the niches of the windows, which caused a new formation of bone tissues and finally complete ankylosis of the stapes. The results of his investigations he summarized as follows:

"The bony tissue of the labyrinthine capsule forming the neighborhood of the oval window is changed into a newformed bony substance. The newformed masses of bone stain much deeper with carmine than the neighboring normal bone. The differences in the color is so pronounced that it is possible to distinguish the pathologic part from the normal with the unaided eye. The bone corpuscles appear more numerous in the pathologic than in the normal bone. But the chief point is the enormous dilation of the bony spaces, which distinguishes the normal from the pathologic tissue. The contents of the space varies in the different cases. In many specimens they are filled with a connective tissue rich in cells, which encloses larger or smaller blood vessels. In the cases of new formation of bone of later date, the dilated spaces are filled with extensive blood vessels which are laden with blood corpuscles. On the other hand, the older pathologic bony tissue contains in its bony spaces blood-vessels crossing each other in every direction, and containing few corpuscles. Finally, I found in several specimens, in addition to the blood vessels giant cells in varying number, osteoblasts and osteoclasts."

Politzer especially emphasizes the fact that the most apparent changes in the bony tissues are found not in the vicinity of the middle ear mucous membrane, but in the deeper layers of the labyrinth capsule, as well as the appearance of isolated islands of pathologically altered bone in the vicinity of the internal meatus and cochlea, and claims that is due to a primary disease of the labyrinthine capsule.

Although the fact that the cases examined by Politzer were all of advanced age, allowing the inference that they were senile changes, his findings were later confirmed by all other investigators.

In the same year, Bezold$_{175}$ explained according to Politzer's theory a case of bilateral stapes ankylosis, in which, especially on the left side the pathologic process was confined to the stapes and its vicinity. Bezold based his explanation on the fact that the histologic examination, especially of the left ear, showed a complete normality of the middle ear (mucous membrane, etc).

Although Politzer's description of the histologic findings, corresponds on the whole, to the anatomic picture of otosclerosis, and although it is apparent from his description that he saw the foci of spongification in the labyrinth capsule, still Siebenmann and his pupil, Ed. Hartmann$_{176}$ were the first to regard these foci as something so peculiar to otosclerosis that Siebenmann[178] wished to call the entire process a "progressive spongification of the labyrinth capsule."

The additional microscopic findings with which Ed. Hartmann made us acquainted from Siebenmann's clinic are the following:

"Bony stenosis of the pelvis ovalis, complete ossification of the ligamentum annulare, formation of a spongy bony wall around the oval window, on the vestibular side, pressing inward of the posterior and pressing outward of the anterior part of the stapes.

On the right side are found similar conditions, with the difference that the most superior part of the upper circumference of the ligamentum annulare is not yet ossified. The spongifying process extended over a large part of the bony cochlear capsule. The cochlear spiral consisted, abnormally, of compact bony substance, which had increased at the expense of the bony and nerve canal. The microscopic examination of the right labyrinth showed, furthermore, a growth of the perineural and perivascular connective tissue in the basal turn, with a normal (?) number of ganglia and nerve bundles and normal organs of Corti. The stapedius muscle had degenerated to a connective tissue band, while the tensor tympani was normal."

In the second case of Ed. Hartmann, the disease was also not confined to the oval window and its vicinity. The pathologic process in the bone of the window margins in both cases had progressed forward as far as the cochlea. The appearence of the bone corpuscles, which in the pathologic bone were plump, irregular, and numerous and dense especially at the places where they bordered on normal bone, speaks for the fact that it was case of new formation of bone and not a conversion of old. Considering the large number and dense arrangement of these bone corpuscles, especially at the places bordering on normal bone, it seemed to Hartmann, that it was probably a new formed, metaplastic, connective tissue bone.

In two cases of ankylosis of the stapes, specimens of which were demonstrated by Habermann[177] at the 7th German Otologic Congress, the ankylosis also was complicated by a disease of the bone extending to the vestibular wall.

One year later, Siebenmann reported a case of the highest interest both clinically and anatomically.[178] In it were found formations of osteophytes on both the tympanal and vestibular side of the oval window, and spongy foci in the bony capsule of the semicircular canals, vestibule and cochlea. In the right labyrinth were six foci of spongification: Only a loose connection existed between the first two of these, while the others were marked off from each other. Furthermore, there was a beginning ossification of the cartilage of the stapes, with a beginning ossification of the ligamentum annulare stapedius (on the left side). The spot of predilection of the foci of spongification, the oldest of which was found at the border between the primary capsule of the labyrinth and the parostal connective tissue bone, was where the well known remains of primary cartilage are found (Manasse). This fact brought Siebenmann to the conclusion that sclerosis was the last phase in a process of development that seldom appeared in the cochlea.

Siebenmann[180] described another important and complete anatomic finding in a female, aged 64, who died of carcinoma hepatis. Although the contents of the middle ear were normal, there was a single wedge-shaped focus of spongification in the labyrinthine capsule, whose position corresponded to the whole upper border and the anterior half of the oval window. The base of the wedge, 4 mm. in diameter, reached superiorly to the facial canal and the canalis pro nervo utriculo-ampullari as well as to the lateral portion of the canalis pro tensore tympani; its apex lay 2 mm. under the niveau of the inferior border of the fenestra ovalis, in the vestibular wall on the side of the middle ear. Superiorly, the focus extended rather deep into the bone, between cochlea and vestibule. Over the part of the spongy focus that lay immediately under the mucous membrane of the middle ear, was an osteophytic growth of the superior border of the niche, so that the superior border of the stapes plate was hidden externally by an overhanging wall of bone and was pressed somewhat inward. The stapes was bound to the exostosis by a hard band, poor in nuclei; from its anterior border, two osteoid adhesions, only very slightly ossified, extended to the border of the oval window. The inferior part of the plate of the stapes was pressed toward the tympanum, and at the same time dislocated anteriorly and inferiorly. In the few large medullary spaces that still remained in the already old spongy focus there was true medullary substance, a phenomenon not yet observed. Siebenmann explained the acute interstitial neuritis of the trunk of the acoustic nerve as a sequence of carcinoma cachexia.

Siebenmann's theory that the "progressive spongification of the labyrinth capsule" was the last phase in a developmental process that seldom appeared in the cochlear capsule was opposed by Katz[181]. He recognized fully the importance of Siebenmann's anatomic finding of the formation of medullary spaces, but regarded the origin of the foci of spongification as well as the new formation of bone in the sclerosis as always of inflammatory nature, viz. a periostitis of the middle ear.

The anatomic specimen, on which the theory of Katz rests, shows the following points of interest:

"1. The hammer and anvil are extremely osteoporotic, the corresponding joints greatly involved, as well as the attic wall and a part of the neighboring wall of the external meatus.

2. There is pathologic formation of medullary spaces, of an old date, in the labyrinth capsule, especially at the anterior portion of the oval window, and extending from there to the basal cochlear turn or porus acusticus internus, and to the semicanalis tensoris tympani and to the facial canal.

3. An osteophyte on the promontory which narrowed the niche of the oval window, and disturbed the free movement of the stapes.

4. No bony synostosis of the stapes-vestibular articulation. The plate is almost intact, as is the symphysis.

5. The characteristic stain with carmine or hematoxylin of all the places affected by the formation of medullary spaces (resorption and apposition).

6. In the middle ear (attic) was a large amount of fibrous connective tissue which has grown fast to or merged with the mucous-periosteal lining, which is a certain sign of a previous inflammation of the middle ear.

7. Atrophy of the nervus cochleae within the lamina spiralis ossea in the lower cochlear turn. Corti's organ, in spite of allowance to be made for poor conservation, can be regarded as affected. Ganglion cells intact."

The author considers the most important parts of these finding to be the fact that there is no ankylosis, at least no bony ankylosis of the stapes; that the bone disease was not limited to the labyrinth capsule, but extended to the hammer and anvil, and that there were signs of a previous inflammation in the middle ear. Katz (l. c.) in opposition to Siebenmann, regards the bone changes in "sclerosis" as of inflammatory origin, the product of an ostitis vascularis chronica ossis temporum, which he identified with the "vascular ostitis" of R. von Volkmann. He bases his view on the importance of the Haversian canals and the blood vessels running in them in the formation of medullary spaces, as is seen most plainly in individual cases. "In fresh cases I have especially noticed the new formed, wide capillaries in the microscopic examination of the affected bone."

This process in the temporal bone, which is characterised by resorption, without suppuration, of old bone and apposition of a new bony tissue that is less dense and partially more voluminous, he thought he could identify, on the grounds of his microscopic examination, with the chronic vascular ostitis of Volkmann, because in the last disease "new canals with vessels are formed from the Haversian canals, which break through the lamellae in various directions thus forming medullary spaces, and which finally lead to disappearance of the bone and osteoporosis."

Katz thinks that the undoubted heredity of the affection does not rest on an inheritance of an anatomic abnormality of the temporal bone (narrowness of the Eustachian tube, or the middle ear, according to v. Tröltsch), but on the inheritance of a constitutional diathesis, and that the otitis media was only the accidental condition that started the trouble.

He regards the following dyscrasic diseases as having etiologic relation with sclerosis. 1. The rheumatic-gouty diathesis. 2. The scrofulous. 3. The syphilitic. 4. Unknown senile changes, on which Schwartze lays especial stress. 5. Neuroparalytic or trophoneurotic diathesis.

The demonstration by Katz[182], of a rarefying ostitis of both outer ossicles in a one year old child suffering with chronic otorrhea, causes the thought that a sclerosis may follow a chronic suppuration of the middle ear, or accompany it. And it is true that certain clinical facts show that a sclerosis may be hidden by a chronic middle ear suppuration—it must be left to the future to determine whether the latter is the primary or only the accidental disease.

Although, in general, after the cure of a chronic suppuration, the functions remain stable, we sometimes see in these cases, e. g., in healed radical operations, an increase in the deafness, without any change in the objective findings being demonstrable as an explanation for the fact.

Whether a sclerosis is also at the bottom of this phenomenon must be determined by further anatomic investigations.*

While it seems that an otosclerosis may be masked by other diseases of the ear, we also think that sclerosis may give to other diseases a definite character. To give an example, it seems that a sclerosis is the basis of the cases of acute catarrh "with prepondering hyperemia," to which v. Tröltsch and Schwartze have given a special classification, on account of their unfavorable prognosis.

Furthermore, Habermaun[183] showed that the bone disease begins where the larger or smaller periosteal vessels enter the bone and that it advances in the bone along these vessels.

What conclusions can be drawn as to the anatomic picture of otosclerosis, from the findings of the last decade.

Pathologico-anatomic, the following has been shown; the disease appears in multiple foci. They are usually distinct from one another. Only in one case (Siebenmann$_{178}$) was there a loose connection between two foci. The appearance of these foci is irregular, in one case (Siebenmann,[180]) it was wedge shaped. These foci are found especially in the labyrinth capsule usually near the window, where they generally lead to ankylosis of the stapes—exception, Katz[181]. They appear, however, also in the bony portions of the cochlea, and may lie outside of the labyrinth capsule, e. g., near the internal meatus.

According to Siebemann$_{178}$ they are prone to occur where the well known remains of the primary cartilage are found (Manasse). But they also are found outside of the pars petrosa, e. g., in the ossicles, the external attic wall, and the walls of the external meatus Katz.$_{187}$

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*This increasing deafness can well be considered a masked sclerosis in those cases where there is a manifest sclerotic process in the other ear.

These circumscribed foci consist:

1. Of pathologic new formed bone tissue, This has an osteoid character, is devoid of lamellated structure, has plump, irregular bone corpuscles, which are especially numerous at the places bordering on the normal bone, and possesses a different staining power from that of normal bone,

2. Of ostitic foci and abnormal medullary spaces (the spongifying process of Siebenmann). The inflammatory foci show, in fresh cases, new formed wide capillaries, on account of which Katz$_{181}$ identified this form of inflammation with the "vascular ostitis" of Volkmann.

The oldest changes are usually found in the region of the labyrinthine window, and there the origin of the disease should ordinarily be sought, according to Habermann$_{183}$ where the larger or smaller vessels pass from the periosteum into the bone.

That the disease may start in the ossicles is shown by a case of Katz$_{182}$ where we recongnize the usual anatomic substratum of the rarefying ostitis.

What is the causal relationship between the different pathologico-anatomic findings.

In recent cases we have only foci of ostitis vasculosa. We must seek the primary bony process, therefore, in this vascular inflammation. The new formed capillaries in the vascular, primary, inflammatory foci cause the bone to disappear and form the abnormal medullary spaces (foci of spongification.) This bony resorption is especially due to the osteoclasts, which Politzer$_{174}$ was the first to see in the pathologic medullary spaces.

The varied contents of these medullary spaces in the different stages of the disease leads to the belief that they are filled with new formed bone by the action of the oseoblasts Politzer$_{174}$.

That they may be filled, instead of with bone, with connective tissue, Politzer$_{174}$, or even with medullary substance Siebenmann$_{180}$, is to be regarded as the exception to the rule, according to the results of our previous anatomic investigations.

We see then, that the different anatomic findings in sclerosis, the circumscribed foci of new formed bone and the ostitic foci causing formation of abnormal medullary spaces are only different stages of one and the same process.

Whether changes in the sound perceiving apparatus follows the bonedisease cannot yet be said with certainty. The rule is negative, according to the anatomic findings we possess.

As to the age, in which the affection is accustomed to appear, it ranges according to Ed. Hartmann, on the ground of 22 cases collected from the literature, between 20 and 50 years. That it can commence earlier is shown by a case of Scheibe[284], 8 1/2 year old deaf and dumb child, and the case of Katz[182], already cited, 1 year old child.

The history, even the most careful, gives no unimpeachable data as to when the disease began, because those affected pay attention to the affected ear and come to the physician only after the disease has existed a long time and a considerable part of the hearing is lost.

I have repeatedly found the condition accidentally in children of 10 to 14 years of age, who have come to the clinic on account of other ear affections, neuralgia, etc.

The index to the sclerosis of which the patient was ignorant—they thought they could hear normally—was usually the well known Schwartze's symptom of a hyperemia; occasionally very slight shining through a normal, delicate drum, which was free from all residues of previous inflammation.

The test for hearing showed that there was present an evident diminution of the normal power of hearing, of which the patient was ignorant.

Although this disease, on the side of the pathologic anatomy, has for the most part been made clear by the investigations of the last decade, the views of the different authors vary as to its cause, and actual nature.

I have already stated that less is to be expected from anatomic investigations than from careful, thorough histories which relate not only to the patient but also to his family. I demanded, in order to progress with the question of the etiology, that the family tree of otosclerotics be constructed and the constitutional conditions of the individual members be very carefully examined.

Any one who knows the literature will agree with me that the histories reported often leave considerable to be desired.

Although the disease was considered by some authors to be a constitutional one, others especially lately Habermann$_{177}$ have taken the standpoint that it is a result of an otitis media, especially of an insidious otitis media following a chronic suppurative rhinitis.

But the more that the anatomic investigations showed that the main lesion was an entirely characteristic circumscribed focus, extending into the depths of the pars petrosa, whose distance from the mucous membrane of the middle ear spoke as much against the disease being a result of an otitis media as the fact that similar changes have hitherto not been found so deep in the pars petrosa as a result of otitis media, just so much more this view as to the origin of sclerosis loses ground.

In addition, in frequent cases of sclerosis, in spite of the most careful microscopic examination, no signs of a previous otitis media could be discovered, and the drum and middle ear at times seemed so normal that the assumption of a previous otitis media that had completely healed in the meantime had to be discarded.

While the fairly regular bilaterality of the process, although not always externally demonstrable, spoke in a certain way for the constitutional nature of the disease, the anatomic pictures, especially the histologic peculiarity of the new formed bone, gave the impression that the disease was specific.

Whether the disease is a syphilitic one, whether it is, as Gradenigo thought, a manifestation of syphilis hereditaria tarda (parasyphilitic affection of Fournier), for which many clinical facts speak, as well as the agreement in many respects with the syphilis of other cranial bones, must be undecided for the present.

Likewise, for the present the question of the influence of the other dyscrasiae mentioned by Katz must be left open.

Though it has been shown without question, that the bone process may come about without any previous otitis media, some (Katz,) have returned to this as an etiologic factor, of course not in the earlier sense, but as the exciting cause which sets up the characteristic bony disease when the hereditary anomaly is present.

Therapy has not kept step with our advancing knowledge of the anatomy of sclerosis. Although the anatomic findings show the impossibility of fighting the disease with local mechanical means, we still find that physicians hold to those means with a tenacity that does not find its explanation in good results. We need only to refer to electric massage, which was abused in many cases.

I have never seen with this treatment a lasting functiona result, which corresponded to the labor and time expended, and cannot but believe that in cases where a real and lasting result was obtained there was an insidious exudative middle ear process, which was not discovered by the otoscope.

But that by this treatment there is frequently an amelioration of the tinnitus not etiologically explainable, I can no more deny than the fact that the patient after the treatment often feels subjectively much better.

These results, although palliative, justify the treatment. This must under all circumstances be a careful and guarded one, because as a local irritation, it can cause a rapid loss of hearing. The frequently unfavorable, irritative action of this and other local methods of treating the ear is easily understandable in sclerosis, since we know that the irritation of the mildest otitis media can awaken the slumbering bone affection.

In the year 1896, I[185] described my unsuccessful attempts at operative treatment and gave an exhaustive critique of this, especially the removal of the stapes, in which enthusiasts, ignorant of the anatomic nature of sclerosis thought they had an operation whose benefits would exceed that of cataract operation.

As to the internal treatment with phosphorus, of which Siebenmann said that it was beyond the stage of experimentation, the future must decide Perhaps in it we have a means which will arrest the disease in its very beginning; perhaps it would be good to give it prophylactically where there is hereditary pre-disposition.

At any rate, the pathologic anatomy of sclerosis shows beyond doubt that the internal treatment is the only way that deserves to be further tested.

Although according to our present views, this disease is incurable, we can often make the patient more comfortable. Where our therepy is to be applied, can be determined only after a careful examination of the whole body. And this can be done only by that aurist who is at the same time a learned general practitioner.

LITERATURE.

1. Launois, Oreille moyenne normale et microbes. Annal des mal. de l'or., etc., 1896, No. 5.

2. Preysing, Die gesunde menschliche Paukenhöhle ist keimfrei. Zentralbl. f. Bakt., etc., Bd. XXV. Nr. 18.

3. Hablauer, Die Bakteriologie der akuten Mittelohrentzündung-Klinische Vorträge aus dem Gebiete der Otolog., etc., herausgegeben von Prof. Haug, 1901.

4. Barnick, Die tuberculösen Erkrankungen d. Gehörorgans, Ebenda, 1899.

5. Lewin, Ueber das klinische und pathologisch-anatomische Verhalten des Gehörorgans bei der genuinen Diphtherie. Archiv. f. Ohrenheilk. Bd. LII. S. 162 ff. und Bd. LIII. S. 1 ff.

6. Leutert, Bakteriologisch-klinische Studien über Komplicationen akuter und chronischer Mittelohreiterungen. Ebenda. Bd. XLVI S. 190 ff und Bd. XLVII. S. 1 ff.

7. Zeroni, Ueber Betiligung des Schläfenbeins bei akuter Osteomyelitis. Ebenda. Bd. LIII. S. 315 ft.

8. Brieter, s. Verhandl. des V. Otolog-Kongresses in Florenz. Zeitschr. f. Ohrenheilk. Bd. LLVII. S. 134.

9. Moure, Sur un cas d'osteomyelite aigue du temporal consécutive a'l'influence. Rev. hebdomad. de lar, etc., 1899.

10. Green, J. Orne, Die primäre Infection der akuten Eiterungen der Trommelhöhle. The Journ. of the Boston Society of Med. Sciences, January, 1899.

11. Leutert, s. Bürkners Bericht. Archiv. f. Ohrenheilk. Bd. XLI. S. 48 ff.

12. Pes und Gradenigo, Ueber die rationelle Therapie der akuten Mittelohrenzündung. Ebenda. Bd. XXXVIII. S. 43. ff.

13. Roaldes, Note preliminaire sur quelquesunes des particularites du negre en otologie. Revue de lar., d'otol. et de rhinol., 1895, No. 24.

14. Lermoyez, and Helme, Les staphylococques et l'Otorrhè, Paris, 1895, bei G. Masson.

15. Kobel, Weitere Beobachtungen über die Wirksamkeit des

Behringschen Diphtherieheilserum. Deutsche med. Wochenschr., 1894, No. 51.

16. Stern, Beiträge zur bakteriologischen Kenntnis der Otitis med pur. chronica. Zeitschr. f. Ohrenheilk. Bd. XXVI. S. 32 ff.

17. Zaufal, Aktinomykosis des Mittelohres, etc., Prager mediz. Wochenschrift, 1894.

18. Cozzolino, Ueber einen Fall von Pseudoaktinomykose, etc., Archiv. f. Ohrenheilk. Bd. XLVI. S. 37 ff. und Bd. L. S. 199.

19. Scheib, Meningitis suppurativa, bedingt durch Bacterium lactit aerogenes (Escherich). Prager med Wochenschr., 1900, No. 15.

20. Barrago-Ciarelli, Ueber einen Fall von akuter, durch Blastomyzeten bedingter Otitis. Annali di otologia, etc., Vol. II. Fasc. I.

21. Schilling, Ueber den Pseudodiphtheriebazillus bei akuter Mittelohrentzündung, Monatssch. f. Ohrenheilk, 1902, S. 413.

22. Aschoff, Die Otitis media neonatorum. Zeitschr, f. Ohrenheilkunde, Bd. XXXI. S. 295 ff.

23. Berthold, Ueber die allgemeinen pathologischen Beziehungen der Mittelohrenkrankungen im frühen Kindesalter. Sitzungsber, des Vereins für wissensch, Heilk, zu. Königsberg i.Pr. Sitzung vom 7, Februar, 1898.

24. Georges-Paul Veillard, Sur les otites du nouveau né et du nourisson, Rev. hebd, de lar. et d'otol, 1900, No. 42.

25. Politzer, Beiträge zur pathologischen Anatomie der Otitis med. acuta im Säuglingsalter, Monatsschr, f. Ohrenheilk, 1900, No. 11.

26. Hartmann, Die Mittelohrentzündung der Säuglinge, Deutsche med. Wochenschr, 1894, No. 26.

26a. Hartmann, Die Einwirkung der Otitis media der Säuglinge auf den Ernährungszustand, Zeitschr, f. Ohrenheilk, Bd. XXXIV. S. 1 ff.

27. Göppert, Untersuchungen über das Mittelohr des Säuglings im gesunden u. krankhaften Zustande, Jahrb. f. Kinderkrankh, Bd, XLIV. Heft 3.

28. Barth, Mittelohrentzündung im frühen Kindesalter, Zeitschr, f. Ohrenheilk. Bd. XXXII. S. III ff.

29. Ponfick, Ueber die allgemein pathologischen Beziehungen der Mittelohrerkrankungen in fruhen Kindesalter, Berliner klin. Wochenschr, 1897, No. 38.

30. Heermann, Ueber Otis media im frühen Kindesalter (Otitis concomitans). Samml. zwangloser Abhandl. usw. von M. Bresgen. Bd. III, Heft 4 C. Marhold, Halle a. S. 1898.

31. Weib, Zur Aetiologie und Pathologie der Otitis media im Säuglingsalter. Zieglers Beiträge zur pathol. Anatomie, etc., 1900, Bd. XXVII.

32. Davidsohn. Ueber Otitis media diabetica, Berliner klin. Wochenschr. 1894, No. 51.

33. Brieger, Klinische Beiträge zur Ohrenheilkunde, etc. Wiesbaden J. F. Bergmann, 1895.

34. Eulenstein, Die Ohrerkrankungen der Diabetiker. Deutsches Archiv f. klin. Medizin. Bd. XLVI. S. 270 ff.

35. Grunert, Zur Frage des Vorkommens von Glykosurie infolge von Otitis. Archiv. f. Ohrenheilk. Bd. LV. S. 156 ff.

36. Alt, Ferd., Stoffwechseluntersuchungen bei Otosklerosis, Monatsschr. f. Ohrenheilk, 1902, S. 445.

37. Schwabach, Ueber Erkrankungen des Gehororgans bei perniziöser Anämie. Zeitschr. f. Ohrenheilk. Bd. XXXV. S. 1 ff.

38. Ibid., Ueber Erkrankungen der Gehörorgans bei Leukämie. Ebenda. Bd. XXXI. S. 103 ff.

39. Bezold, Ergenbnisse der pathologisch-anatomischen Untersuchung des Ohres bei Masern. Münch. klin. Wochenschr. 1896, No. 10 u. 11.

40. Rudolph, 18 Sektionsbrichte Ueber das Gehörorgan bei Masern. Zeitschrift f. Ohrenheilk. Bd. XXLX. S. 209 ff.

41. Lommel, Beiträge zur Kenntnis des pathologisch-anatomischen Befundes im Mittelohr und in den Keilbeinhöhlen bei der genuinen Diphtherie, etc., Ebenda. 1896.

42. Stangenberg, Emil, Beiträge zur Kenntnis des Verhlätnisses zwischen Diphtherie und Ohrenkrankheiten, Nordiskt medicinsk Arkiv, XXXV. Abteil. 1. Heft 1. No. 4.

43. Haug, Beitrag zur Kasuistik der im Verlaufe der Brightschen Nierenerkrankung auftretenden komplikatorischen Ohr und Nasenblutungen. Deutsche med. Wochenschr. 1896, No. 45.

44. Jehangir S. Cursetji, Quelques aspects de la pratique otologique dans l' Inde, et particulierement a Bombay, etc., Annal. des malad. de l'oreille, etc., 1900, No. 2.

45. Schwabach, Ueber Tuberkulose des Mittelohres. Berlin. Klinik. 1900. Heft 114, 14 December, 1897.

46. Scheibe, Ueber leichte Fälle von Mittelohrtuberkulose und die Bildung von Fibrinoid bei denselben. Zeitschr. f. Ohrenheilk. Bd. XXX. S. 306 ff.

47. Licci (Genua), Die Tuberkulose des Ohres, s. Morpurgos Bericht über den 5. Kongress der itilienischen Geselschaft für Otologie, etc., Archiv. f. Ohrenheilk. Bd. LVIII. S. 135 ff.

48. Ostmann, Ueber die durch Tuberkulose der nächsten Blutsverwandten geschaffene Disposition zu Ohrerkrankungen bei Kindern. Ebenda. Bd. LV. S. 72.

49. Suckstorff, Die Ohrkomplikationen bei einer schweren Typhusepidemie. Zeitschr. f. Ohrenheilk. Bd. XLI. S. 75.

50. Schuhmacher, Die Erkrankungen der Ohren im Verlauf des Abdominaltyphus; Protokoll der Gesellschaft der Kinderärzte. Wratschnebaja Gaseta, 1902, No. 19 St. Petersburg.

51. Koch, Ueber die Einwirkung des Tauchens auf das Gehörorgan. Sonderabdr. der Festschrift zur 100 jähr. Stiftungsfeier des mediz.-chirurg. Friedrich-Wilhelms-Instituts. Berlin, 1895.

52. Alt, Heller, Mager, v. Schrötter, Pathologie der Luftdruckerkrankungen des Gehörorgans. Monatsschr. f. Ohrenheilk. No. 6, 1897.

53. Barth, Rachenmandel und Ohr. Ebenda. Nr. 11. 1897.

54. Müller, Ueber den Einfluss heftiger Geschützdetonationen auf das Ohr. 1899.

55. Asher, Ueber Mittelohrentzündung nach Trigeminusresektion. Beiträge zur klin. Chirurgie, etc., 1849.

56. Krause, Fedor, Die Physiologie des Trigeminus nach Untersuchungen an Menschen, bei denen das Ganglion Gasseri entfernt worden ist. Münch. med. Wochenschr. 1895.

57. Braunstein und Buhe. Gibt es Anastomosen zeischen den Gefässbezirken des Mittelohres u. Labyrinths? Archiv. f. Ohrenheilk. Bd. LVI. S. 261.

58. Tomka, Ueber Entwichlungsanomalien des Steigbügels. Ebenda. Bd. XXXVIII. S. 252.

59. Ibid., Ein Fall von überzählichem Gehörknöchelchen in der Trommelhöhle des Menschen. Ebenda. Bd. XXXIX. S. 1.

60. Hammerschlag, Gehörorgan einer zwerghaft gewachsenen 20 jährigen Frau; Sitzungsber der Oesterr. otolog. Gesellsch. vom 25, April, 1899, Monatsschr. f. Ohrenheilk. 1899. Nr. 5.

61. Alexander, Ein Fall von Persistenz der Arteria stapedia beim Menschen. Ebenda. 1899, Nr. 7.

62. Politzer, Serienschnitte von einem taubstummen Individuum: Sitzungsbericht der Oesterreich. otolog. Gesellsch. vom 28, Okt. 1901, Ebenda. 1902, Heft. 1.

63. Kaufmann, D., Ueber doppelseitige Missbildung des Gehörorgans. Zeitschrift f. Ohrenh. Bd. XXXIX. S. 210.

64. Haug, Ein Fall von kongenitaler Missbildung der Gehörknöchelchen. Monatsschr. f. Ohrenheilk. 1901, S. 132 ff.

65. Grunert, Bericht über die Tätigheit der Kgl. Universitäts-Ohrenklinik zu Halle a S. etc., Archiv. f. Ohrenheilk. Bd. XXXVI. S. 278 ff.

66. Kaufmann, Ueber Enkatarrhaphie von Epithel. Virch. Arch. Bd. XCVII.

67. Blumberg, Ueber sogenannte traumatische Epithelzysten. Deutsche Zeitschr. f. Chirurgie. Bd. XXXVIII. Heft 6. S. 605 1894.

68. Singer, Ein Fall von Osteophytenbildung am Trommelfell. Monatsschr. f. Ohrenheilk, 1901, S. 72.

69. Haug, Allerlei Kasuistisches aus der Ohrenabteilung der chirurgischen Poliklinik zu München. Münch. med. Wochenschr. 1894, Nr. 35 ff.

70. Corradi, Die Perforation des Trommelfelles durch indirekte Ursache besonders von dem gerichtsärztlichen Standpunkte aus. Archiv f. Ohrenheilk. Bd XXXIX. S. 287 ff.

71. Körner, Eine neue Form von Influenzaotitis. Zeitschr. f. Ohrenheilk. Bd. XXVII. S. 9 ff.

70b. Pritchard, Fraktur des Hammergriffs durch indirekte Gewaet. Kings College Hospital, Rep. 1897.

72. Tomka, Ein Fall akuter Mittelohrentzündung bei Morbus maculosus Werlhofii. Archiv. f. Ohrenheilk. Bd. L. S. 207.

73. Sugur, Purpura rheumatica und Gehörorgan. Ebenda. Bd. L. S. 25.

74. Rohrer, Ueber Varicenbildung im Trommelfell; s. Rudloffs Bericht des VI. internat. otolog. Kongr. in London. Ebenda Bd. L. S. 274.

75. Grunert, Zur Aetiologie des primären interlamellaren Trommelfellabszesses. Ebenda. Bd. LVII. S. 200.

76. Katz, Uber Spalt-resp. Zystenbildung an der Stria malleolaris des Trommelfells; s. Bericht von Bürkner über die 7 Vers. der deutschen otolog Gesellsch. am 27 u. 28 Mai 1898 zu Würzburg. Ebenda. Bd. XLV. S. 106 ff.

77. Politzer. Ueber persistente Trommelfellucken; dritter Osterreich. Otologentag am 21. u. 22. Februar 1898. Monatsschr. f. Ohrenheilkunde 1898. Heft 3.

78. Barnick, Ueber Brüche des Schädelgrundes, etc., Archiv. f. Ohrenheilk. Bd. XLIII. S. 23 ff.

79. Stillkraut. Erkrankungen des Gehörorgans bei chronischen Nephritiden. Diss. inaug. München, 1894.

80. Camerer, Ueber Fremdkörper, welche die Tuba Eustachii durchdringen. Dissert. inaug. Tübingen, 1894.

81. Schmiegelow, Corps etranger dans la cavite tympanique, extractions, tetanus. Rev. de lar, d'otol. etc. 1894, No. 5.

82. Ostmann, Fremdkörper im Ohr. Deutsche med. Wochenschr. 1896, Nr. 46.

83. Trautmann, G. (München), Ueber einen Fall von Fremdkorper in der Tuba Eustachii. Munch. med. Wochenschr.

84. Richter, Ueber zwei seltene vergessene Fremdkörpereinlagerungen in Nase und Ohr und eine eigentümliche Fremdkörperwanderung. Monatsschrift f. Ohrenheilk. 1901, Nr. 3.

85. Haug, Fremdkörper in der Tubaegegand nach früherer Radikaloperation. Peritonsillarer Abzess. Archiv. f. Ohrenheilk. Bd. LVII. S. 35.

86. Schade, Wanderung eines Nagels vom Nasenrachenraum in das Mittelohr. Deutsche med. Wochenschr. 1902, Nr, 44

87. Haug, Ueber Exsudatansammlungen im oberen Paukenraum bei Influenza, etc., Archiv. f. Ohrenheilk Bd. XL. S. 161 ff.

88. Katz, Zur Frage der bei der akuten eitrigen Mittelohrentzündung vorkommenden Trommelfellzapfen, deren Therapie und histologische Struktur, Ebenda. Bd. L. S. 211.

89. Bezold, Weitere Bemerkungen über die bei der akuten eitrigen Mittelohrentzündung vorkommenden Trommelfellzapfen, deren Therapie und histopathologische Struktur, Ebenda. Bd. LI. S. 299 ff.

90. Katz, Hypertrophie der Schleimhaut der Paukenhöhle bei

Otitis media acuta; s. Bericht von Schulze und Buhe über die Karlsbader Naturforscherversammlung vom Jahre, 1902, Ebenda. Bd. LVII. S. 104.

91. R. Panse, Labyrintheiterung nach akuter Mittelohreiterung. Bürkners Bericht, etc.

92. Scheibe. Durchbruch ins Labyrinth. insbesondere bei der Form der akuten Mittelohreiterung; s. Bürkners Bericht l. c.

93. Lemcke, Ueber akute Karies und Nekrose des Felsenbeins nach Influenza; Bericht von Bürkner, Archiv. f. Ohrenheilk. Bd. XXXVII. S. 123.

94. Hebler, Ueber rarefizierende Ostitis des Warzenfortsatzes nach Otitis externa ex infectione; s. Burkners Bericht. Ebenda. Bd. XLIII. S. 172 ff.

95. Körner, Die eitrigen Erkrankungen des Schläfenbeins. Wiesbaden, J. F. Bergmann, 1899.

96. R. Panse, Klinische und pathologische Mitteilungen. Archiv. f. Ohrenheilk. Bd. LVI. S. 274.

97. Katz, Weg der Entzündung vom Mittelohr nach dem Labyrinth; Bürkners Bericht. Ebenda. Bd. XLIII. S. 172 ff.

98. Manasse, Durchbruch von Granulationen durch die Stapesplatte bei chronischer Otorrhö (Präparatdemonstration); s. Rechls Bericht. Ebenda. Bd. XLVII, S. 230.

99. Politzer, Histologische Veränderungen der Mittelohrschleimhaut bei der chronischen Mittelohreiterung im Kindesalter. Moskauer Internat. Med. Kongress. Sektion XIIa, 1897.

100. Zeroni, Beitrag zur Kenntnis der Heilungsvorgänge nach der operativen Freilegung der Mittelohrräume. Archiv. f. Ohrenheilk.) Bd. XLV, S. 171 ff.

101. Grunert, Beitrag zur operativen Freilegung der Mittelohrräume, etc., Ebenda. Bd. XL., S. 188 ff.

102. Green, J. Orne, Caries of the ossicles, Boston city hospital medical and surgical reports, 1895.

103. Körner, über Karies der Gehörknöchelchen; Sitzung des Rostocker Aerztevereins vom 11, Juni, 1898, Ref. Zeitschrift für Ohrenheilkunde, Bd. XXXIII.

104. Kretschmann, Klinische und pathologische Beiträge zur Karies von Hammer und Amboss, Festschrift zum 50jähr. Jubiläum des Magdeburger Aerztevereins, 1898.

105. Pritchard, Veränderungen im Amboss-Steigbügelgelenk durch chronische Mittelohreiterung, Kings College Hosp. Rep., 1897.

106. Brieger und Görke, Erkrankungen der Gehörknöchelchen, Erste Forge des Abschnittes Otologie, redigiert von Primärarzt Dr. Brieger: 38, Lief. des stereoscop. med. Atlas von Prof. Alb. Neisser, Leipzig, Joh. Ambros, Barth, 1901.

107. Donalies, Histologisches und Pathologisches vom Hammer und Amboss. Archiv. f. Ohrenheilk, Bd. XLII, S. 226, ff.

108. Katz, Erkrankgung des Hammer-Ambossgelenks; s. Schulze u. Buhes Bericht l. c.

109. Hammerschlag, Beitrag zur pathologischen Anatomie der Gehörknöchelchenkette. Archiv. f. Ohrenheilk, Bd. LV, S. 82.

110. Manasse, über Granulationsgeschwülste mit Fremdkörperriesenzellen. Virchows Archiv. Bd. CXXXVI, 1894.

111. Ibidem., über riesenzellenhaltige Schleimzysten in Polypen und in entzündeten Schleimhäuten, Zeitschr. f. Ohrenh. Bd. XXXIII, S. 302 ff.

112. Zeroni, über Cholesteatom in einem Ohrpolypen. Archiv. f. Ohrenheilk, Bd. XIII, S. 188 ff.

113. Kümmel, Referat über die Neubildungen des Ohres; v. Burkners Bericht, Ebenda, Bd. XLIII, S. 277.

114. Brieger, Demonstration von mikroskopischen Präparaten; v. Rudloffs Bericht. Zeitschr. f. Ohrenheilk, Bd. XXXV, S. 147 ff.

115. Görke. Pathologisch-anatomische Untersuchungen von Ohrpolypen. Archiv. f. Ohrenheilk, Bd. LII, S. 59 ff.

116. Brühl, Zur Histologie der Ohrpolypen, Zeitschr. f. Ohrenheilkunde, Bd. XXXVIII. S. 1 ff.

117. Haug, Beiträge zur Würdigung der Hyperostose des Felsenbeins. Archiv. f. Ohrenheilk, Bd. XXXVII, S. 163 ff.

118. Okuneff, Sclerose de l'apophyse mastoide present ant une des complications des otites moyennes chroniques suppurèes. Sektion XIIa des internat. med. Kongresses zu Moskau, 1897.

119. Schwartze, über erworbene Atresie und Striktur des Gehörganges und deren Behandlung. Archiv. f. Ohrenheilk, Bd. XLVII. S. 71 ff.

120. Zeroni, Ein Fall von Carotisblutung infolge von Karies des Schläfenbeins. Archiv. f. Ohrenheilk, Bd. LI, S. 97 ff.

121. Heine, Fall von Arrosion der Carotis durch Cholesteatom; v. Haikes Bericht. Ebenda Bd. LII, S. 256 ff.

122. Heermann (Essen a. R.), Ein Fall von Carotisblutung, Ebenda. Bd. LV, S. 86.

123. Jürgens, Erwin. Zwei Fälle von Ruptur der Arteria carotis interna bei Affektionen des Mittelohres. Monatsschr. f, Ohrenh. 1902, S. 3 ff.

124. Panzer, Zur Anatomie der akuen Tympanitis. Dritter Oesterr. Otologentag am 21, u. 22 Febr.. 1898. Ebenda, 1898, Heft 3.

125. Grunert und Meier, Jahresbericht der Hallenser Ohrenklinik. Archiv. f. Ohrenheilk, Bd. XXXVIII, S. 205 ff.

126. Buhe, 35 jährige Facialislähmung, Ebenda. Bd. LVII, S. 101.

127. Habermann, Zur Pathologie der chronischen Mittelohrentzündung und des Cholesteatoms des äusseren Gehörgangs. Ebenda. Bd. L. S. 232.

128. Schwartze, Cholesteatoma verum squamae ossis temporum. Ebenda. Bd. XLI, S. 207.

129. Körner, Ein Cholesteatoma verum in der hinteren Schädelgrube durch eine akute Mittelohreiterung infiziert und vereitert, etc. Zeitschr. fur Ohrenheilk, Bd. XXXVII, S. 352.

130. Haug, über das Cholesteatom des Mittelohres. Zentralblatt fur allgemeine Pathologie und patholog. Anatomie 1895, Bd. VI, Nr. 3/4.

131. Jansen, uber Hirnsinusthrombose nach Mitteloreiterungen. Archiv. f. Ohrenheilk, Bd. XXXV, S. 63 ff.

132. Siebenmann, über Ozaena (Rhinitis atrophica simplex et foetida). Korespondenzbl. f. Schweizer Aerzte, 1900. Nr. 5.

133. Politzer. Cholesteatom; v. Blocks Bericht, Archiv. f. Ohrenheilk, Bd. XXIX, S. 126 ff.

134. Morf, Beiträge zur Pathogenese und zur Radikaloperation des Mittelohrcholesteatoms. Mitteilungen aus den Kliniken und med. Instituten der Schweiz; 3, Reihe, 7. Heft. Basel u. Leipzig, 1895.

135. Dreyfus, Ueber Mittelohrtuberkulose mit spezieller Berücksichtigung des Ausaganges in Heilung. Dissert. inaug. Basel, 1898.

136. Leutert. Pathologisch-histologischer Beitrag zur Cholesteatomfrage. Archiv. f. Ohrenheilk, Bd. XXXIX, S. 233.

137. Hugel, Otitis media purulenta und ihre Folgen. Beitrag zur Aetiologie des Cholesteatoms, Dissert. inaug. München, 1895.

138. Kretschmann, Bericht über die Tätigkeit meiner Klinik im Jahre, 1896. Archiv. f. Ohrenheilk, Bd. XLII, S. 277.ff.

139. Lubet-Barbon, Observations sur un cas de vaste cholesteatome du temporal. Arch. internat. de l'ar., d'otol, XI, p. 6.

140. Haug, Arrosion des Gehirns infolge von Cholesteatom; Durchbruch cholesteatomatöser Massen in den Seitenventrikel. Archiv. f. Ohrenheilk, Bd. LV, S. 26.

141. Barnick. Beicht aus Prof. Habermanns Klinik. Ebenda. Bd. XLII, S. 16 ff.

142. Sonntag, Zur pathologischen Anatomie des Schläfenbeins. Monatsschrift f. Ohrenheilk, 1902. S. 472.

143. Zeroni, Ueber das Karzinom des Gehörorgans. Archiv. f. Ohrenheilk, Bd. XLVIII, S. 141 ff.

144. Sturm, Zur Kenntnis des primären Plattenepithelkrebses im Schläfenbein. Zeitschr. f. Ohrenheilk, Bd. XL, S. 276.

145. Alexander, Ueber einen Fall von Kazinom der Paukenhöhle; Sitzungsbericht der Oesterr. Otolog. Gesellsch. vom 27 Jan., 1902. Monatsschr. f. Ohrenheilk, 1902. Heft 4.

146. Körner, Ein Fall von Chlorom beider Schläfenbeine, beider Sinus sigmoidei und beider Orbitae, eine otitische Phlebitis des Sinus cavernosus vortäuschend. Zeitschr. f. Ohrenheilk, Bd. XXIX, S. 92 ff.

147. Lubarsch, Zur Kenntnis der Chlorome des Schläfenbeins. Ebenda. Bd. XXXII, S. 129 ff.

148. Krepuska. s. Polyak, Sitzungsber, der Gesellsch. der ungar. Ohren und Kehlkopfärzte. Printed in manuscript form.

149. Haug, Beitrag zur Kasuistik und pathologischen Histologie der malignen Tumoren des Schläfenbeins. Endothelkarzinom des Schläfenbeins mit Rekurrens—und Hypoglossuslähmung, Durchbruch in die Schädelhöhle mit Vorwuchern an die Schädelbasis. Archiv. f. Ohrenheilk, Bd. XLVII, S. 113 ff.

150. Schwabach, Plattenepithelkrebs. Berl. klin. Wochenschr, 1894. Nr. 43.

151. Haug, Beiträge zur pathologischen Anatomie und Histologie des Gehörorgans. Zieglers "Beiträge zur pathol. Anat., etc." Bd. XVI.

152. Story. A case of malignant disease of the middle ear. Lancet. 27 April, 1895.

153. Ash, Das Sarkom des Ohres. Dissert. inaug., Strassburg, 1896.

154. Grunert, Hallenser Jahresbericht. Archiv. f. Ohrenheilk, Bd. XLIV, S. 25.

155. Kirchner, Sarcom des Warzenfortsatzes; v. Sczenes' Bericht. Ebdena. Bd. XLIII, S. 203 ff.

156. Kuhn, Ein Fall von Myxosarkom der Paukenhöhle. Deutsche mediz. Wochenschr., 1894. Nr. 27.

157. Friederich, Sarcom des Mittelohres mit Ausgang von der duva; v. Burkners Bericht. Archiv f. Ohrenheilk. Bd. XLV, S. 106 ff.

158. Schmeden, Ein Tumor der Felsenbeinpyramide; v. Rudloffs Bericht. Zeitschr. Bd. XXXV, S. 147.

159. Hegener, Beiträge zur Klinik und Histologie sarkomatöser Geschwulste des Schläfenbeins. Zeitschr. f. Ohrenheilk, Bd. XXXVII, S. 117.

160. Eschweiler. Ein Fall von Fibromyxom des Warzenfortsatzes. Archiv. f. Ohrenheilk, Bd. XLV, S. 18 ff.

161. Haug, Klinik und mikroskopische Anatomie des ausseren und mittleren Ohres. Ebenda. Bd. XXXVI, S. 201.

162. Moure, Angiome caverneux de l'oreille. Rev. de laryn. d'otol., etc , 1895. No. 19.

163. Green, J. Orne, v. Transact. of the Americ. otol. Soc., XXVIII annual meeting. Vol. VI, Part 2, 1895.

164. Jansen, Eine intratympanale Geschwulst; v. Bürkners Bericht. Arch. f. Ohrenheilk, Bd. XLV, S. 106.

165. Breiger, uber Tuberkulose des Mittelohres: v. Rudloffs Bericht (l. c.).

166. Garbine und Ballistreri, Beitrag zur Lehre von der Tuberkulose des Mittelohres. Arch. italian. di Otol. T. IX, p. 181.

167. Körner, Tuberkulose des Schläfenbeins, etc., Monatsschrift f. Ohrenheilk, 1894. Nr. 9.

168. Haenel, Ein Fall von beginnendem Durchbruch der bei dem Labyrinthfenster bei Caries tuberkulosa des Mittelohres mit mikro-

skopischer Untersuchung. Zeitschr. f. Ohrenheilk, Bd. XXVIII, S. 42.

169. Barnick. Die tuberkulosen Erkrankungen des Gehörorgans. Klinische Vorträge, etc., herausgeg. von Haug, Jena, 1899, G. Fischer.

170. Piffl, Otitis tuberculosa mit tumorartiger Protuberanz in der Schädelhöhle. Zeitschr. f. Heilk, 1899, Bd, XX.

171. Warnecke, Ein Fall von Otitis media chron. foetida mit Cholesteatom, kompliziert durch Tuberkulom des Kleinhirns und Meningitis tuberculosa. Archiv. f. Ohrenheilk. Bd. XLVIII, S. 202 ff.

172. Haike, Beitrage zur pathologie und pathologischen Anatomie des Mittelohres und des Labyrinthes. Ebenda. Bd. XLVIII. S. 228 ff.

173. Baer, Ueber tuberkulose Granulationsgeschwulste des Mittelohres, Zeitschrift f. Ohrenheilk, Bd. XXXVII. S. 60 ff.

174. Liaras, G. (Bordeaux), Du lupus de l'oreille. Rev. hebd. de lar,, etc., 1900. No. 5, 6, 7.

175. Politzer, Ueber primäre Erkrankung der Labyrinthkapsel Zeitschr. f. Ohrenheilk, Bd. XXV. S. 309.

176. Bezold, Ein weiterer im Leben diagnostizierter Fall von doppelseitger Steigbügelankylose mit Sektionsbefund, etc., Ebenda. Bd. XXVI, S. 1 ff.

177. Ed. Hartmann, Zwei neue Fälle von doppelseitiger knocherner Stapesankylose. Ebenda. Bd. XXXIII, S. 103 ff.

178. Habermann, Präparate von zwei Fällen von Stapesankylose; v. Burkners Bericht (l. c.).

179. Siebenmann, Fall von Spongiosierung der Labyrinthkapsel; v. Rechls Bericht. Archiv. f. Ohrenheilk, Bd. XLVII, S. 330.

180. Scheibe, Iräparat vollkommener Stapesankylose; v. Rechls Bericht (l. c.).

181. Siebenmann, Ueber einen weiteren Fall von Spongiosierung der Labyrinthkapsel usw. Zeitschr. f. Ohrenheilk, Bd. XXXVI, S. 291 ff.

182. Katz, Anatomischer Beitrag zur Frage der bei dem chronischen trockenen Mittellohrkatarrh (Sklerose?) vorkommenden Knochenerkrankung des Schläfenbeins (chronische vaskuläre Ostitis Volkmann) mit einigen Bemerkungen. Archiv. f. Ohrenheilk, Bd, LIII. S. 68 ff.

183. Katz, Cholesteatombildung; Erkrankung des Hammer-Ambossgelenks, rarefizierende Otitis v. Bericht von Schulze und Buhe (l. c.).

184. Habermann, Verhandlungen der Deutschen otologischen Gesellschaft zu Breslau, 1901. S. 182.

185. Scheibe, ebenda. S. 175.

186. Grunert, Was konnen wir von der operativen Entfernung des Steigbügels bei der Steigbügel-Vorhofankylose zum Zweck der Horverbesserunger hoffen? Archiv. f. Ohrenheilk, Bd. XLI, S. 294 ff.

XXIX.

CHRONIC NON-SPECIFIC LARYNGITIS; CLINICAL FORMS; TREATMENT.*

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General Remarks. Definition and Division of the Subject.

Chronic inflammation may attack any of the constituent parts of the larynx. Very rarely, however, are non-specific inflammatory processes of slow evolution observed in the deep layers of the laryngeal wall. On the other hand, they are quite frequent in the laryngeal mucosa. We will limit our study to inflammations of the mucosa, for which we will reserve the term "chronic laryngitis," without considering deep inflammations of the laryngeal walls—independent affections, to which it is properly the custom to devote separate descriptions.

In the group of chronic laryngitis thus delineated, the symptomatology is quite variable, and the laryngoscopic examination gives dissimilar results according to the cases. To make a profitable study of the affection it is necessary to attempt to group the cases of evident analogy. It is then recognized that the variations in appearance usually correspond to variations of seat, extent and histologic evolution, thus constituting distinct clinical forms, whose etiology, course and prognosis present well-marked differential characters and demand different treatment.

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A study of these clinical forms will be our present object. I shall group into one class the cases in which the dominant phenomenon appears to be an alteration of secretion, and separate them from a second class where either a diffuse or circumscribed hypertrophy presents itself clearly enough not to be confounded with simple inflammatory swelling, and therefore is of prime importance. I shall oppose, then, the "catarrhal laryngitis" to the "hypertrophic laryngitis." While the lesions require a grouping of their laryngitis into one of these forms, some patients have erosions or ulcerations of the mucosa. I shall discuss these, but without giving them, as heretofore, the name of "ulcerous varieties," and shall consider them as terminal complications of the form in the course of which they may be observed. On the other hand, I shall include in the group of hypertrophic laryngitis certain lesions whose inflammatory origin, in the majority of cases at least, is established, and whose description it seems to me ought to be separated from the artificial group of tumors. I also desire to speak of various hyperplasic productions, which it has previously been usage to consider as benign tumors, and describe them under the name of "polypi of the larynx."

We will commence our study by an exposition of tha knowledge acquired as to the histo-pathology of chronic laryngitis, as well as its general etiology. Then after taking cognizance of the laryngoscopic signs in different forms, we will study their special etiology, their symptoms, their course, their progress, their prognosis, and their diagnostic characters. We will finish with a discussion of treatment.

I.

PATHOLOGIC ANATOMY, ETIOLOGY AND GENERAL PATHOGENESIS OF CHRONIC LARYNGITIS.

A—Histologic Lesions of the Laryngeal Mucosa in Chronic Diffuse Laryngitis. — Pachydermia Laryngis of Virchow.

In acute or sub-acute catarrhal laryngitis all the layers of the mucosa are not involved, except in severe cases. In chronic laryngitis, on the contrary, all the layers are concerned, though to different degrees. The glands are constantly altered in varying degrees, often slight. They are almost always more or less hypertrophied. Along with the glandular hyperplasia, there is usually swelling of the adjacent connective tissue. The chorion is infiltrated with leucocytes. Later it is thickened by a new formation of connective elements, ending possibly in glandular atrophy.

The epithelium undergoes divers alterations. In the region where it is ciliated, it may be seen as a mass of cylindrical, ovoid, irregularly planted cells. In places it may be almost entirely desquamated. It may undergo another modification and become stratified pavement over a variable extent. At the same time there is observed an abnormal thickening of pavement epithelium at points where it normally exists, and to a marked degree; there may be a completely keratinized layer, containing eleidin.

On the surface of the chorion, the normal papillae are hypertrophied, and there are new-formed papillae at points where the pavement epithelium has replaced the normal ciliated. In extreme cases the swelling shows itself in the form of vegetating or non-vegetating tumors, especially in the interarytenoid region and upon the vocal cords. Virchow has given to this condition of the mucosa the name "pachydermia laryngis." The results of his researches and of other writers have been, in general, concordant, and establish the fact that laryngeal pachydermia constitutes a mode of reaction of the laryngeal mucosa to causes of inflammation of long duration, whatever they may be.

When lesions of this sort develop in the posterior portion of the larynx, the thickened epithelium has a tendency to desquamate in mass. The interarytenoid, polypoid products are finally detached spontaneously, whence the formation of superficial erosions, rhagades, or even of ulcerations proper, possibly increasing in depth and leading to perichondritis, chondritis, and cartilage necrosis. But these fissures are generally superficial, and heal rapidly if they are not aggravated by local inflammation.

When these ulcerations are seated at the anterior part of the larynx, they have no tendency to disappear, and the process leads to a circumscribed hyperplasia. The lesions do not resemble those which Virchow described as diffuse pachydermia. However, this author has deemed it proper to apply the name "verrucous pachydermia." The contrast between the two, remarks Virchow, is more apparent than real, and depends upon the fact that in front the cartilages are more superficial and the vascular network more developed. But in both cases the productions are of inflammatory origin.

B—Histologic lesions of the laryngeal mucosa in certain circumscribed forms of hypertrophic laryngitis. Structure of polypi of the larynx.

Inflammatory nodules, singers' nodules or vocal nodules, have been studied histologically by numerous authors. The small nodules are simple epithelial thickenings, with or without keratinization, covering the normal or hypertrophied mucous lining. The more developed nodules may present two different types histologically. In the first type the body of the nodule is formed by a thickening of the mucosa composed of a very thin fibrous tissue, separated from the epithelium by a loose band of connective tissue. In the second type the body of the nodule is formed of a pseudo-myxomatous tissue traversed by veins and large dilated capilliaries with thin walls. Between this mass and the epithelium there is no lamellous zone—only a very thin base, surmounted by two or three layers of pavement cells. The reddish nodosities on the surface of the vocal cords, which often coincide with the nodules of "granular laryngitis" are only pachydermal swellings. It is to be seen, then, that the histologic study of "singers' nodules" permits the establishment of all degrees between simple pachydermia and fibrous or mucous polyps.

Fibrous polypi, which are very common, are almost always seated upon the vocal cords in the anterior region, in the vicinity of the commissure. Ordinarily single, the growth is rounded, sometimes of a lobulated appearance, and usually sessile. The dimensions vary from those of a grain of millet to a large cherry. Growth is slow. The tissue has the characters of fibrous tissue. Their smooth, but unequal surface is invariably covered with stratified pavement epithelium, under which is found a layer of more or less developed papillae.

Eversion of the ventricle of Morgagni shows itself as a sessile, ventricular polyp, projecting into the larynx. It has long been regarded as a prolapse of the mucosa. But, outside of tuberculosis and syphilis, there may be observed ventricular eversions which are, it appears, genuine fibrous polyps of inflammatory origin.

Mucous polypi, which, like fibrous, are seated upon the vocal cords, are generally of small size. Like mucous polypi of the nose, they have wrongfully been given (Jacques) the name myxomata. The structure of mucous polypi of tbe larnyx differs from mucous polypi of the nose only in the absence of glands and glandular cysts. Renaut called them "pseudomyxomata."

Papillomata of the larynx are either circumscribed or diffuse. Histologic examination invariably shows them to be composed of papillae made up of connective tissue and blood vessels, and covered with stratified pavement epithelum. When the papillae are short they are smooth. When they are long and uneven there is a villous type (rare) and a cauliflower type (common). Sometimes they are keratimized and eleidin is found (horny papilloma). Finally papillomata of the larnyx may be considered as hypertrophies in mass of papillae, and not as tumors.

Glandular hypertrophies, giving rise to extensive thickening of the mucosa in chronic catarrhal laryngitis, constitute, to speak correctly, small adenomata (Cornil and Ranvier). We also find in the larynx, but very rarely, circumscribed adenomata. The glandular culs-de-sac are here larger than normal, but their epithelial cells preserve their physiologic characters. They are sometimes surrounded by a fibrous shell, as I have observed in a private case.

Cysts of the larynx are almost invariably glandular cysts by retention. These cysts, rounded, usually gray and transparent, covered with a thinned mucosa and embroidered with vascular arborizations, have been rarely examined histologically. They are found in the form of a pouch full of liquid mucus, either clear or opaque, or a viscid substance like honey. The internal surface is smooth and covered with a single layer of cylindrical epithelium.

Cavernous angioma of congenital origin is rare in the larynx. But more frequently there occurs in fibrous or papillary thickenings a sort of plaque, formed of anastomosing vascular dilations, with an aneurysmal or varicose appearance. There may also be observed upon the vocal cords ecchymous or real submucous hematomata, possibly giving rise to blood cysts.

The study of the histologic structure of these various circumscribed lesions leads us to group them with pachydermia laryngis, either in the typical anatomic form, or in other forms where the alterations predominate either in the epithelium or connective tissue (inflammatory nodules, granular laryngitis), or in the epithelium and hypertrophied papillae (papillomata), or in the connective layer of the chorion mucous or fibrous polypi. Finally, if we consider that the isolated glandular hyperplasia (adenomata), which may be observed upon the vocal cords, do not differ histologically from the glandular hypertrophies seen in other regions in the course of old chronic catarrhal laryngitis; that cysts of the larynx are always glandular; that true angiomata are rare in the larynx, where the lesions called "angiomata" are almost never anything more than vascular dilations associated with fibrous thickening or papillary hypertrophy; we arrive at the conclusion already indicated that the group of benign tumors of the laryngeal mucosa, clinically designated polypi of the larynx, is purely artificial and should be included with catarrhal laryngitis.

C—Etiology and General Pathogenesis of Chronic Laryngitis.

Rarely chronic at outset, chronic laryngitis, in a great number of cases follows acute or subacute inflammatory processes. Ordinarily, chronic catarrh installs itself only when the patient has previously suffered repeated acute or subacute attacks. After a number of recurrences, resolution is not complete; persistent lesions appear, and soon begin their slow, steady progresss.

Thus the affection develops in individuals who have coryza and chronic angina. In the genesis of laryngeal lesions, the dominant factor is insufficient nasal permeability, which obliges the patient to breathe through the mouth, and thus exposes the larnyx to direct action of air too cold, too dry or laden with dust and germs. However, outside of insufficient permeability, other affections of the nose (ozena) or chronic tonsillitis may induce chronic laryngitis by extension. Hypertrophy of the uvula, to which an undisputed etiologic value has long been attributed, is, in general, a consequence of chronic diffuse angina which so often coincides with laryngitis, and has no special influence upon the developmen of the latter.

Chronic laryngitis has other intrinsic predisposing causes in the chronic non-specific affections of the lower respiratory passages, especially those which provoke frequent and prolonged coughing (chronic bronchitis, emphysema, etc.). In poorly compensated valvular lesions and progressive myocarditis, there exists a congestive state of the larynx which favors the appearance of the persistent lesions of chronic inflammation.

Chronic laryngitis is easily established in patients with chronic gastro-intestinal troubles. It is the same with migraine, rheumatism, hemorrhoids, neuro-arthritis. In the arthritic affection par excellence, fat diabetes, there is also chronic laryngitis in a number of cases. It is frequent in the gouty.

It is common to consider lymphatism as a state which specially predisposes to chronic inflammations of the prima viae. But this morbid temperament is often only the result of bad hygienic conditions which themselves create the predisposition.

These various predisposing causes are met with frequently in those subject to chronic professional laryngitis, where their profession exposes them to fatgue of the larynx and resulting local congestion (orators, preachers, comedians, singers, etc.). Functional overuse is one of the most potent exciting causes, especially at a time when the larynx is attacked by acute or subacute catarrh, however slight,

Another class of chronic laryngitis of professional origin attacks individuals whose trade exposes them to continuous, prolonged, or repeated action of smoke or irritating dust (mechanics, chimney sweeps, stone masons, etc.).

Chronic laryngitis develops very often in heavy smokers. Alcohol in every form is more obnoxious to the larynx than tobacco, the use of which is often associated.

The influence of sex is only apparent. Men are not attacked more frequently than women, except as their manner of life exposes them more than women to exciting causes. Venereal excess. in many persons, has an undeniable reaction upon the vocal apparatus, and this applies to both sexes. In young persons onanism may provoke continuous laryngeal congestion. Utero-ovarian affections produce repeated congestion of the larynx, which may, in some cases, induce chronic laryngitis. The beginning of menstruation may cause congestion or aggravate a chronic laryngitis, or even induce submucous hemorrhages or hemoptysis. Pregnancy and the menopause may also give rise to phenomena of the same nature. Castration of the female appears only rarely to have harmful effects upon the voice.

The influence of age is not clear. The majority of patients are adults of 35 to 50 years. Exceptional in the old and in infancy, the malady is more common in childhood. In young boys it is frequently developed during the period of voice change. This precocious laryngitis disappears sometimes spontaneously at the change of voice or the approach of puberty.

In a broad way, chronic laryngitis is more frequent in cold and moist countries than in temperate and warm regions; but it is especially favored by sudden variations of temperature.

Is there a special etiology for polypi of the larynx? When we consult the writers upon this subject, it is easily apparent that there is none. The etiologic conditions are identically the same, in reality, as those of chronic laryngitis and we are fully justified, from this point of view, in considering them as products of inflammatory origin.

The process of repair in the laryngeal mucosa presents nothing special. When the causes exciting chronic laryngitis cease to act, spontaneous amelioration, then cure, may supervene, more or less complete. But this fortunate course is not a necessary consequence to the development of in-inflammation. It may occur that the evolution of the various lesions is associated with diverse influences, the age of the patient, innate or acquired temperament, state of health—all the causes which may in different ways modify the vital properties of the tissues.

II.

A—CATARRHAL FORMS.

(*a*) *Simple Chronic Catarrhal Laryngitis.*

LARYNGOSCOPIC APPEARANCE.—In recent and mild cases the lesions are little marked. The mucosa of the epiglottis and that of the entire vestibule shows a slight dull roughenening, most marked upon the ventricular bands. The membrane, a little swollen, has here a dull aspect, and appears moister then normal. The inferior vocal cords are often grooved with vessels. They have become grayish, roughened and moist and appear relaxed. In the laryngeal cavity there is mucus of variable appearance.

In other cases the vocal cords become rosy or even red to a varying extent. But the secretions are not more abundant than in the preceding condition. When the lesions have not led to interference with the nutrition of the muscles, the speaking voice and even the singing voice may be preserved. But in a great number of rather old cases, there is a paresis of the adductor muscles, and vocal tension is insufficient.

Finally, in the more severe cases, all these changes are present in highest degree in all parts of the larynx. Sometimes even, the presence of venous networks of varicose appearance, gives the larynx an aspect which Mackenzie called "laryngeal phlebectasia."

While the color and abundance of secretion are variable, thickening of the mucosa is rarely absent. The epiglottis may be deformed to the point of making examination difficult; the aryteno-epiglottic folds may be very much thickened. The ventricular bands may enlarge until they cover the vocal cords. In some cases the tumefaction brings on dyspnea and wheezing.

The state of the vocal cords is not in constant relation to that of other parts of the larynx. They are sometimes roughened and swollen, sometimes grayish, flabby and relaxed. When the patient attempts phonation they vibrate unequally, and produce only raucous and broken sounds. This dysphonia is further increased by the swelling of the interarytenoid mucosa which hinders adduction of the vocal cords. In this degree the catarrhal laryngitis borders upon diffuse hypertrophic.

Symptoms.—General symptoms are completely wanting. The pain is nil, or only a vague sensation of intralaryngeal irritation. If the patient coughs, it is because of concomitant tracheitis or bronchitis. However, in certain cases, and under the influence of certain causes, there may ensue genuine slight attacks of laryngeal vertigo. The alteration of the voice is quite variable. The dysphonia may show every degree from slight roughening to deep hoarseness. Complete aphonia is rare.

Course and prognosis.—The course is steady, with more or less frequent exacerbations and ameliorations, consequent upon various influences. In children, cure easily follows when the causes cease to act. In the adult there is no tendency to spontaneous cure. The prognosis is never grave except as to the voice, complete re-establishment of this function being very difficult to obtain.

Diagnosis.—The laryngoscopic examination, which is indispensable, will suffice to differentiate simple chronic catarrh from syphilitic or tubercular laryngitis. But sometimes, to exclude tuberculosis with certainty, careful examination of the lungs and prolonged observation will be necessary.

(b) *Laryngitis Sicca.*

The etiology of this variety is somewhat special. It nearly always coincides with a fetid atrophic rhinitis, or with a chronic catarrh of the pharyngeal tonsil of the dry type. Laryngoscopic appearance—In mild cases, the mucosa is rough, dry, sometimes dark. The vocal cords, which are gray or rosy, appear to be united at the anterior ends. The interarytenoid space is usually covered with greenish black mucus. The tension of the vocal cords is nearly always deficient. Sometimes shallow erosions or more or less deep fissures can be seen.

In older cases and during an exacerbation, there may be a more or less marked aggravation manifesting itself in an increase of secretion, with its persistent retention in the larynx.

Symptoms, course and prognosis—Hoarseness is rarely absent. It may be intermittent or constant. When there is an 'aggravation the dysphonia is accompanied by a raucous aggravating cough. Sometimes respiratory difficulties may set in, especially in neurotics, even suffocative attacks with glottic spasm. The cough results in the expulsion of hard concretions, sometimes followed by blood-streaked sputum. It is exceptional to see a real laryngeal hemorrhage—a laryngitis sicca complicated with the hemorrhagic.

Laryngitis sicca is one of the most rebellious forms of chroic laryngitis. The amelioration corresponds to that of the nasal or pharyngeal affection upon which it depends, but recurrence ensues in a majority of cases after a variable time.

Diagnosis.—The laryngoscopic signs of laryngitis sicca give it a characteristic individuality. The dyspneic complications may, in some cases, resemble those of laryngeal diphtheria, especially when accompanied by the expulsion of exudated membrane of uncertain character.

The diagnosis of the hemorrhagic form with true hemoptysis may give more serious difficulty, as hemorrhagic laryngitis has been observed in pulmonary tuberculosis.

B.—Hypertrophic Forms.

We shall distinguish only two classes of chronic hypertrophic laryngitis —diffuse and circumscribed—passing over the clinical study of laryngeal polypi. We will not speak here of the lesion described under the term chronic, hypertrophic, subglottic edema. It appears now to be well established that this affection is not autonomous and should be included either with rhinoscleroma or syphilis.

(a) *Diffuse Hypertrophic Laryngitis*

1. Late form.—Under this head I place those cases of old and severe chronic catarrhral laryngitis in which permanent and diffuse swelling of the mucosa takes lead over the secretory troubles. This form, which is rare, it seems to me, ought to be noted, but deserves no special description.

2. Pachydermic form.—In a number of cases, the dermo-papillary transformation may show itself simultaneously over a great extent of the larynx. In some patients, the entire laryngeal cavity has a pale yellow tint, bright in some places, dull in others, and a dry appearance without trace of mucus; it might be said that the larnyx is covered with a skin-like membrane.

In some cases the lesion resembles absolutely the diffuse form of laryngeal leucoplakia, or milky plaques on the buccal surface—tobacco smoker's disease. As I have twice observed coincidence of these lesions upon the tongue and the larynx, I believe that we may call this curious lesion of the larynx laryngeal leucoplakia. Have we to do always in cases of this sort with syphilitic or parasyphilitic lesions, or simple pachydermic lesions? I am not in a position to answer this question.

Symptoms, course, prognosis and diagnosis of diffuse hypertrophic laryngitis.—The symptomatology, course and the prognosis of the first type, as well as the pachydermic type, present nothing special. The diagnosis of the generalized pachydermic form from the sclerous form of tuberculosis may in some cases necessitate bacteriologic examination and inoculation tests.

(b) *Circumscribed Hypertrophic Laryngitis.*

ANTERIOR CIRCUMSCRIBED HYPERTROPHIC LARYNGITIS.

(a) Nodular Laryngitis. Laryngoscopic signs.—Nodular laryngitis (singer's nodules) is characterized by the presence on the anterior third of the free border of the vocal cords, of two nodules, with dimensions varying from a small pinhead to a grain of millet. They are never pedicled. Sometimes there is only one. Upon attempting phonation their summits are brought into juxtaposition, thus preventing complete approach of the vocal cords.

Symptoms and diagnosis.—When the nodules are very small, the spoken voice is, in general, good. The singing voice alone is affected. In some cases, especially when the nodules are of some size, there is observed a peculiar affection of the singing voice, diphonia, or simultaneous emission of two different sounds. More often than diphonia, is observed the phenomenon known as "coulage" of the voice. "The air escapes between the cords—the note is accompanied with a slight hissing" (Castex). When the nodules are somewhat large and there is acute catarrh, singing becomes impossible, and even the speaking voice is greatly roughened.

The diagnosis is obvious. The only thing of importance is not to mistake for nodules small masses of mucus at the point of election for these nodules.

Etiology and pathogenesis—course and prognosis.—In adults the influence of sex is marked (80 to 95 per cent. of women). In children it appears to be almost nil.

The influence of profession is very important. The great majority of patients are singers. Bad use of the voice, overuse of the voice—the same causes as for other forms of laryngitis in singers and orators, or rather the same cause, functional fatigue.

The prognosis is serious from a vocal point of view when the patient is abandoned to herself, and the most dilligent treatment is not always effective.

(b) Granular laryngitis.—I apply this name to a type of hypertropic laryngitis characterized by the presence on the anterior thirds of the vocal cords of protuberance resembling isolated granulations of the pharynx. Along with them the vocal nodules are generally more rough, larger and more rounded than the preceding form. This affection, often consecutive to the former, often develops quickly. It is an almost constant type in children, rare in men, extremely frequent in women. The symptoms are those of the preceding form, but not accentuated. The prognosis, grave in the adult, is relatively benign in children. Many cases cease after puberty, either without treatment, or with a few precautions, hygienic rather than therapeutic.

(2) *Circumscribed posterior hypertrophic laryngitis* (*typical diffuse pachydermia of Virchow*).

Laryngoscopic signs.—This may show itself as a lesion almost entirely limited to the region of the vocal process, or, on the other hand, extending to the interarytenoid region.

(*a*) Apophysary pachydermia.—This variety is seated in the posterior part of the vocal cord. At a certain degree of development the lesion appears as an oval, bilateral tumefaction, occupying the internal border and the greater part of the superior surface of the vocal cord, with elevated margins and at its center a slight depression. The tumefaction begins at the internal side of the vocal process, and sometimes its development may be observed from the beginning.

(*b*) Interarytenoid pachydermia.—The lesions may confine themselves to this region and there remain a variable time but usually the hypertrophy extends to the posterior part of the larynx, the interarytenoid region, and invades it in the form of red or whitish protuberances or sharp, horny vegetations, villous and polypoid. These pachydermic masses prevent regular adduction of the cords and considerably increase the alteration of the voice.

Symptoms, course and prognosis.—The symptoms present nothing special. The progress of the affection is essentially chronic, and the prognosis from a functional point of view most grave.

Complications, ulcerations and so-called catarrhal erosions. —There is never really any extensive loss of substance, but some simple erosions in the front of the vocal apophysis take the form of fissures, or rhagades, in the interartenoid space.

Etiology and diagnosis.—Apophysary and interarytenoid hypertrophic laryngitis are affections peculiar to the adult man, especially drinkers and great smokers.

The diagnosis gives no serious difficulty. Sometimes, however, a bacteriologic examination is necessary and is not always sufficient to differentiate simple pachydermia from the symptomatic pachydermia of tuberculosis.

When only one of the cords shows lesions of pachydermic appearance, it is necessary to eliminate syphilitic gumma, epithelioma and circumscribed tuberculous infiltration.

3. *Ventricular Eversion.*

Other than in syphilis and tuberculosis, where it is relatively frequent, ventricular eversion may develop very rapidly after acute catarrhal laryngitis or appear in the course of chronic laryngitis. It most often develops at the expense of the inferior surface of the superior vocal cord, and probably also of the lateral surface of the ventricle. The eversion begins in the inferior part of the ventricle. Little by little the thickness of the ventricular band increases and the ventricular opening is replaced by a more or less red swelling, covering the greater part of the inferior cord. The symptomatology varies according to the volume of the swelling.

Diagnosis is usually easy. It is important to know that tuberculous laryngitis may begin with a superior corditis with ventricular eversion.

4. *Horny papillary corditis.*

I will describe under this name a rather rare affections as yet little known, which merits this designation because of its seat, structure and characters. From a histologic point of view, as Virchow has said, it is a form of pachydermia. It is characterized by a marked development of papillae covered with an extremely thick keratinized epithelium. The lesion has been seen under the glottis and upon a ventricular eversion, but it is almost constantly seated upon the inferior vocal cord, nearly always on one side. The cord is invaded either in part or in totality. Sometimes it is little changed, it shows only a dull, chalky pallor, like that of a "cat's tongue;" sometimes it becomes notched and deformed as if mangled. After being removed with the cutting forceps the tumor has a great tendency to recur. Up to the present the cases of definite cure are very rare. Both sexes are attacked; the majority of cases are in men of about 60 or older, but the affection has been seen in young girls.

III.

TREATMENT OF CHRONIC LARYNGITIS.

A—General Considerations.

In general the first causal indication to be fulfilled, before even treating the larynx, is to do away with the lesions of the nasal fossa and of the epi- and naso-pharynx, if any exist, which is the rule. Exciting causes must be suppressed; the voice must be given absolute or relative rest and local irritation (tobacco smoke, dust, alcoholic liquor) avoided. In mild cases, causal treatment may suffice to produce cure. But usually direct treatment of the chronic laryngitis is necessary, and this is almost exclusively local, the really useful internal medicaments being few.

B—General internal medication.

We will only mention, in passing, certain medicines almost abandoned now, such as singer's syrup,etc. Bicarbonate of soda, chlorate of potash and tar are seldom used. Alkaline, sulphurous and arsenicated waters are rarely utilized to-day, except at watering places.

Medical treatment in the sub-acute attacks gives most service. Bicarbonate of soda in large dose (six to twelve grams per day) in cachets taken with a warm infusion of violets, or lemonade, sweetened with syrup of tolu, have marked favorable action. But the most useful drug in such cases, because of its elective, if not specific, action upon the congestive and catarrhal state of the air passages, is the benzoate of soda, an action which I first called attention to in 1885. But it must be understood that this drug acts well only in large doses (4 to 5 grams for children, 6 to 10 grams for adults). I often prescribe the following syrup, giving 3 to 5 dessertspoonfuls daily, at regular intervals, in a like number of small cups of infusion of violets or warm lemonade:

Benzoate of soda (neutral benzoin)		30.
Syrup of tolu Syrup de capillaire	$\overline{\text{aa}}$	135

Warm and dissolve.

Quinin, antipyrin, or phenacetin, opiates (codein, peronin), may be used to advantage along with benzoate of soda.

In chronic laryngitis with paresis or fatigue of the laryngeal muscles I have found strychnin and nux vomica to be excellent. Some persons improve more under the latter possibly because of the brucin it contains independent of strychnin.

C—Thermal Medication.

The good effect of mineral waters, alkaline, arsenical and sulphuretted, in certain varieties of chronic laryngitis are almost solely due to their local action upon the mucosa of the air passages.

Our confreres at watering places have long since learned the great importance of employing the waters and they have special apparatus for inhalation, spraying, etc. I will limit myself here to an enumeration of the principal French sulphurous and arsenical waters whose action has long been favorably recognized. Of the first I would cite the Pyrenees, Bagnieres-de-Luchon, Eaux-Bonnes, Amelie les Bains. Saint Honore, Aix-en-Savoie, and Challes. Among the second, Mount Dore, Royat and Bourboule. Of those abroad I will mention only Schinznach and Ems, whose efficacy I have proved.

D—Local External Treatment; Massage.

External massage of the larynx. practiced in the Swedish method, appears to have been too much neglected by laryngologists. It requires various manipulations: effleurage, friction, vibration, etc. It probably has a decongestive action and promotes muscular contraction. Whatever its mode of action, it is certainly favorable in some cases.

Electrotherapy.—Electrization of the larynx with rheophores carried directly into it, or into the pharyngo-laryngeal recesses, is rarely utilized nowadays. Electrization of the anterior cervical region is, very properly, preferred.

Either galvanic or faradic currents are employed. The writers do not agree as to their relative efficacy in the cases with which we are now concerned, For four years I have made use of sinusoidal currents (sinusoidal faradization) of moderate potential and frequency. These currents produce energetic but painless muscular contractions. They have thus far given me very encouraging results.

E—Local Internal Treatment.

1. *Inhalations of Steam and Liquid Sprays.*

For this purpose inhalers and atomizers are used. The inhaler should continuously produce a sufficient quantity of vapor to saturate the air going into the respiratory passages with each inspiration. A very practical apparatus, devised by Mandl in 1857, is the following:

A glass globe, a third filled with the liquid to be vaporized, heated by an alcohol lamp and furnished with two tubes, one communicating with the air outside, the other longer and bent obliquely. To the latter is attached a rubber tube with a large glass mouthpiece which the patient holds between the lips. A Russian coffee pot, with some modification, could serve as a useful and cheap inhaler.

The best drugs for inhalation are the balsams: balsam of Peru and benzoin, and certain oils (menthol, eucalyptus, oil of pine, etc). An alcoholic solution is prepared and added to water in the proportion of a teaspoonful to a glass of water. I often prescribe:

Tincture of eucalyptus,	
Tincture of benzoin, aa	60.
Oil of pine,	2.
Menthol,	4.

The oils of myrtle, sandalwood, citron and origanum may also be utilized. The latter, which is rather irritating, should be employed only in small doses and in especial cases.

Atomizers throwing vapor into the throat are the only ones to employ in the treatment of chronic laryngitis. I will not describe the well known apparatus of Siegle. The patient should place himself before the apparatus, his mouth wide open, and at the same time, with a towel in his hand, hold the tongue well out, and make deep inspiration.

For atomization, only aqueous solutions of substances soluble in water should be prescribed. Solutions of tannin, sulphate of copper, and sulphate of zinc, 1 to 5 per cent. are of service as astringents. As an antiseptic the solution of choice is a solution of pure carbolic acid in .25, .50 or 75 per cent. strength.

I refrain from describing the numerous apparatuses designed for the inhalation of vapor or atomized fluids; I wish to call attention, however, to one recently invented by Heryng (of Warsaw). I have seen it work, and it appears to be a step in advance.

2. *Instillation by Laryngo-tracheal Injection.*

This method which is relatively recent and was first applied to the treatment of diseases of the bronchi and lungs, notably tuberculosis, is of service in the treatment of some sorts of chronic laryngitis. The instrument most to be recommended for instillation is the three ring syringe of Beehag, which has been excellently modified by Mendel.

Some patients can learn to make the injections themselves. but they are more valuable when done by the physician, under the control of a mirror. Mendel, who directs the jet either in the middle line of the posterior pharyngeal wall or into one of the glosso-epiglottic fossae, is easily able to make a part of the fluid enter the larynx, but some of it also goes into the esophagus, which is not always a matter of indifference. The preferable excipient for these injections is olive oil, sterilized, to which may be added menthol (1 to 3 per cent.) oil of eucalyptus (2 to 6 per cent.), etc.

3. *Topical Applications.*

These applications require the employment of an instrument appropriately called the porte-topique (applicator). Forceps, properly so-called, should be rejected because of their numerous inconveniences. It is preferable to employ a rigid steel cotton carrier, with a handle sufficiently long to be held like a pen, and having at its laryngeal extremity a screw with which to fix the tampon of absorbent cotton. According to the case, the application may be simply by contact or by friction.

The useful applications are either the astringent or mildly caustic solutions, or antiseptic solutions.

Among these, nitrate of silver is the most commonly employed, without fully justifying the confidence placed in it. I have long since substituted for it chlorid of zinc, weak solutions of which, 1 to 4 per cent., are most useful. Sulphate of zinc and tannin sometimes give better results than zinc chlorid. As a topical antiseptic I employ almost exclusively phenol sulphoricinate.

From 10 to 30 per cent. it answers all purposes. When it is badly borne, which is rare in the larynx, I have often advantageously used instead of it the sulphoricinated balsam of Peru.

Another application, which is astringent or caustic and also antiseptic, according to strength, is the following iodin solution:

Iodin	2.
Iodid of potassium	3.
Distilled water	20. to 25.

F—Endolaryngeal surgical operations.

Anesthesia of the larynx.—Only local anesthesia is safe for operations. To obtain it, freshly prepared, concentrated solutions of cocain should be used. Some add to this adrenalin. Lubet-Barbon gets slight anesthesia by insufflating equal parts of cocain and sugar, and complete anesthesia by instillation of a tenth or twentieth per cent. Moure is of the opinion that it is necessary to complete the anesthesia by applying the agent with a cotton carrier. I prefer to commence this way. I employ, even in children of 12 to 15 years, strong solutions of cocain, 15, or better, 20 per cent. Some patients, however, have an idiosyncrasy, and this must be anticipated for fear of accidents. A good way to avoid these accidents in suspected persons, is to make them take 15 or 30 drops of Sydenham's tincture of laudanum in a little water. In persons whose pharyngeal reflexes are exaggerated and not abolished by the cocain, the operation should be put off, and in the interval calm the hyperexcitability by means of large doses of bromid of potassium (4 or 5 grams daily) for four or five days. This method, despite the opinion of Chiari and Botey, may alone subdue some throats, which are exceptional, it is true.

Chemical and thermic cauterization.—The powerful and diffusible caustics (chromic acid, for example), should not be employed. Nitrate of silver in stick and very concentrated solutions of iodin are about the only chemical caustics of which I make use. It is very important to make the application with precision. I would say the same of the galvanocautery for which may be employed, according to the case, the point, flat blade or rounded cautery.

Scarification, curettage.—One may use for scarification the laryngeal bistoury, with or without protected blades. I have had constructed by Raoul Mathieu, laryngeal scarifiers with three parallel blades, which I have employed successfully for several years.

The laryngeal curettes of Heryng are to be recommended for the posterior and lateral subglottic walls of the larynx. For the upper surface of the cords, I have had Mathieu make small, rounded curettes, acting as a plane with a spherical surface.

Excision with the cutting forceps.—The tubular system of laryngeal forceps invented by Turck have some indisputable advantages and some inconvenience. I prefer the rigid, jointed forceps. Instead of the bulky Morrell Mackenzie forceps, the sliding forceps of Gottstein or Fraenkel are preferable.

In 1889 I had Aubry construct a cutting forceps with double joints, in two models, one of which opens antero-posteriorly, the other laterally. Other forceps to be recommended are those of Moure and Suarez de Mendoza. It is often advantageous following forceps operations to make topical applications, such as iodo-iodin or sulphoricinated phenol. The patient should keep his room for 24 hours and preserve silence for several days. Weak carbolic sprays may also be prescribed.

C—Treatment of various forms of chronic laryngitis.

1. Catarrhal forms.—Mild catarrhal forms call for the employment of prophylactic and hygienic methods. External massage, electricity, strychnin internally, and sprays may be used; in more severe forms touching up with weak solutions of zinc chlorid, sulphuretted waters in torpid forms, arseniated in congestive attacks. Grave catarrhal forms demand painting with strong solutions of zinc chlorid or sulphate scarification, etc.

The sulphuretted waters of the Pyrenees are often an effective adjunct in the treatment of laryngitis sicca. In subacute attacks with dyspneic symptoms steam gives the best results. In hemorrhagic attacks one may have recourse to astringent sprays (tannin, perchlorid of iron) and adrenalin.

2. Hypertrophic forms.—According to some writers nodular laryngitis should be susceptible of spontaneous cure by resting the voice, or even by changing the manner of singing (Holbrook Curtis) but in most cases surgical intervention appears preferable to me.

If the swelling is soft the application of a galvano-cautery may lead to its disappearance within a few days: but if the swelling is hard the cutting forceps is the instrument of choice. I have a pair of forceps made by Aubry which permit me, because of the one-sided bite, to do this operation with security.

The prognosis of nodular laryngitis should be guarded. Recurrence is not rare, and I have seen several such cases.

Nodular laryngitis and granular laryngitis of children may sometimes cure by rest and after puberty. But it is generally better not to wait. Applications of iodo-iodin, preceded or not by scarification or ablation with the cutting forceps are most efficacious. In the adult this treatment often acts marvelously, but the frequent recurrences darken the prognosis.

The treatment of posterior hypertrophic laryngitis is still more difficult, and little more can be expected than amelioration. The topical application for apophysary pachydermia appears to me to be sulphoricinated salicylic acid. The employment of the cutting forceps should be cautious in this region, because of the danger of laying bare the vocal apophysis which is here very superficial.

The lateral cutting forceps and the curette are, on the other hand, of great service in interarytenoid pachydermia. If the patient is suspected to be tuberculous, recourse may be had to sulphoricinated phenol, 30 per cent.

For eversion of the ventricle use may be made, according to the case, of the galvano-cautery point or the instrument of Mahu. Care must be taken of the underlying vocal cord.

If I had to treat a horny papiliary corditis I would resort to sulphoricinated salicylic acid and my antero-posterior cutting forceps.

PROCEEDINGS OF THE FRENCH SOCIETY OF OTOLOGY AND LARYNGOLOGY. ANNUAL CONGRESS.

SESSION OF MAY 2, 1904.

The president, M. Castex, declared the session open and made the following remarks:

"MY DEAR COLLEAGUES: You have honored me greatly, and I am very thankful to you for having designated me to preside over your work this year.

"If you are willing, we will conform to a pious usage and first honor our dead. Quite recently, the first of April, there died one of our former presidents, Camille Miot. Born at Moulins-Engelbert in 1838, Miot had been pupil and chief of the Blanchet clinic in the National Institution for Deaf-Mutes. His numerous works, which are fresh in your memory, revealed a surgical taste—operative procedures upon the tympanic cavity, diseases of the ear, foreign bodies in the nasal fossae, etc. Personally I had little acquaintance with him, but to the best of my information he merited the friendship of the illustrious, and I consider the following quotation applicable to him: 'Pitying the unfortunate, he lavished upon them his talent, rather than talents, giving to the poor that which came from riches.' I suggest that we give to Madam Miot and her family an expression of our condolences.

"We also have to mourn Dr. Latrille, of Poitiers, honorary member of our society.

"It should be a source of lively satisfaction to us to see our specialty increase year by year and conquer a new kingdom for itself. Does it not appear to you that we are colonials of whom the mother country may well be proud, for we have conquered vast territories hitherto unexplored?

"Our society may claim a good part of these results. It has done much for the expansion of this specialty in France, much also for its dissemination by presenting its works in a clear and elegant form: a la francaise. What a pleasure it is to see the return with spring of the sessions which reunite us, specialists from abroad, from the provinces and from Paris. The work is nicely divided: anatomy, physiology, otitic and nasal affections, presentations of instruments, etc. The discussions are interesting, often inspiring, always useful.

"Permit your president to encourage in you that entente cordiale, so necessary to the encouragement of our work. We give more attention to the ideas of those who sympathize with us. Each of you here, having talent, may well offer the kindness of recognizing that of others: 'For the struggle which destroys lets us substitute union which multiplies.' This is the thought of a wise philosopher.

"Our work, moreover, is far from being ended. Will it ever be? How many questions are unsettled! I shall strive to direct this session for the best."

M. Joal, secretary-general, read his report.

M. Cadier, treasurer, elucidated the financial situation.

A commission, composed of MM. Moure, Jacques and Didsbury, examined the accounts of the treasurer.

Election of the bureau: Vice-president, M. Maurice Boulay, of Paris; Secretary of Session, M. Texier.

MM. Joal and Cadier were retained as secretary general and treasurer.

M. Ruault, of Paris, read a paper. (See page 326.)

Chronic Non-Specific Laryngitis. Clinical Forms. Treatment.

M. Mendel.—I requested the privilege of discussing the remarkable report of M. Ruault, to defend the method of tracheal injection which he mentioned in speaking of the treatment of chronic laryngitis, and a method which I have introduced as a notable simplification of laryngologic technique.

At first let me say to you that it was not to laryngologists that I commended it; they are drilled in laryngeal maneuvers and they easily perform injection without the mirror; I would say to them only: Employ injections of eucalyptolized oil, from one to five per cent.; give them daily for several weeks in tuberculosis, and you will obtain —without cough, without spasm, without reaction—functional and stethoscopic amelioration as surprising as those which I have observed for several years, and which Rosenberg and Beehag, the creators of this method, have remarked.

But I return to the technique itself, which is the subject under discussion. It constitutes a non-laryngologic method, so to speak, in that it does not require the employment of the laryngeal mirror. Permit me to explain it in a few words: It is based upon the fact that a moderate quantity of liquid thrown upon the posterior wall of the pharynx descends by its own weight into the air passages, gliding over the digestive orifice, which is always closed except in deglutition. Now to throw the liquid upon the posterior pharyngeal wall I have conceived two proceedings. One consists in projecting the liquid directly upon the wall. The other, more practical, consists in throwing it upon the lateral wall of the pharynx; from this point, because of the impulse given, the liquid continues with a whirling movement to the posterior pharyngeal wall. These facts are not imaginary; they may be established by the aid of the laryngeal mirror, and in fact have been by several laryngologic writers whose findings I have cited in a book which ought to appear shortly.

Let us now examine the objections of M. Ruault to this method. Here are his own words: "This method may indeed, in certain patients, cause a portion of the injected liquid to penetrate into the larynx, but it allows another portion to pass into the esophagus and stomach, which is not always a matter of indifference."

Now, how many observations does M. Ruault bring to the support of his assertion? Only one. That of a young woman 25 years old in whom he employed the simplified method. "A little of the liquid always passed into the stomach," says he, "and there resulted at the end of about a quarter of an hour, a rather painful sensation of burning in the epigastrium, lasting and hour and a half or even two hours." As for myself, who have employed this method for five years, and made thousands of injections, I have observed this accident, but only as an exception, and an exception which I consider avoidable.

How is the liquid injected upon the posterior pharyngeal wall introduced into the digestive passages? Solely by a movement of deglutition. The digestive orifice is closed, and keeps itself closed, after the projection of the liquid, as is easily demonstrated. The pyriform sinuses are closed, as Lubet-Barbon noted in an examination which he made with me. Finally the occlusion of the digestive orifice may be shown in the cadaver; in six instances I performed tracheal injection according to my method and the greater part of the liquid was found in the air passages, a slight amount remained in the pharynx, and not a drop had passed into the esophagus. If the patient does not swallow at the moment of injection, and if he expectorates the excess of liquid which may remain in the pharynx after the injection, nothing will pass into his stomach. It is merely sufficient to instruct the patient, which is very easy. If the patient swallows a little liquid by inadvertence or negligence, he will feel a burning, as has been observed by M. Ruault, for it is an interesting fact that the air mucosa is much more tolerant to caustic solutions than the digestive mucosa.

Finally, the execution of the method, although it is easy, demands a certain skill which M. Ruault did not possess, but which he could easily acquire; he daily performs more difficult maneuvers.

It is none the less true that all the liquid injected does not always penetrate into the air passages, and a portion is lost. I have been reproached with this in other terms; they have criticized the imprecision of my method, but are they sure, in using the laryngologic methods, of injecting all the liquid into the air passages? Not at all, and a certain portion of the liquid is always, or almost always, rejected. Moreover, imprecision is constant in therapeutics, which is far from being an exact science. Its real criterion is, and always will be, the clinical result.

After answering the objections which have been made to my method, allow me to state briefly its advantages. The two chief are these:

The proceeding is never disagreeable to the patient, for there is almost no instrumental contact, no mirror, no introduction of the laryngeal syringe. This advantage is not negligible and it is only necessary to compare the two procedures to be convinced. My daily injection is always perfectly borne; it is even demanded by patients.

Now, to how many patients is it possible to give daily laryngologic injections without nausea and repugnance? How often is it necessary to use cocain, which I now never use?

Another advantage: The simplified method does not require any special instruction; I have taught it at one sitting to a student, even to a nurse.

And if one desires to use it in the treatment of pulmonary tuberculosis he will find that the method can be better popularized than the laryngologic procedure.

M. VIOLLET—I wish in this connection to report the contradictory results of experiments recently conducted by M. M. Mendel, Lubet, Barbon and Viollet. There were three patients; two of them had been treated over a month, and the third had undergone many intralaryngeal injections. The liquid thrown upon the posterior pharyngeal wall of the patients thus habituated entered the larynx. It does not follow, however, that this would be the case in any patient, or those treated by unskilled hands.

M. RUAULT observed that the inconvenience of introducing fluid into the esophagus could be avoided in only one way—by carrying the medicament directly into the trachea.

M. JACQUES—Eulogy of the very remarkable report of M. Ruault is unnecessary; we all appreciate the value of his work which is just as thorough from the anatomic as the clinical point of view. I think we ought especially to congratulate him for showing the identity of benign tumors in general, and the absence of neoplasic specificity, a fact which is insufficiently set forth in the classic works.

ABSTRACTS FROM CURRENT OTOLOGIC, RHINOLOGIC AND LARYNGOLOGIC LITERATURE.

I.— EAR.

Midlde-Ear Disease in its Relation to Metastatic Abscess of the Liver and Other Viscera.

S. MacCuen Smith, Philadelphia. (*Archives of Otology*, Vol. XXXIII, No 2), reports 3 cases and refers to 3 other cases which he has personally observed of old chronic middle-ear suppuration in which acute exacerbations were followed by pyemia. In two instances the liver alone was involved, in two additional cases the lungs were also the site of multiple pus foci.

The most constant and characteristic symptom was that of severe pain in the right shoulder and neck, appearing synchronously with the beginning of hepatic suppuration.

Jaundice was a constant factor but it appeared so irregularly as to be of little diagnostic value, save confirmatory.

The history of secondary infection in each of these cases is sufficiently clear to warrant the conclusion that a metastatic abscess of the liver, or other viscera, may originate from a suppurative disease of the ear. *Campbell.*

A Contribution to the Pathological Anatomy of the Internal Ear and the Auditory Nerve.

Manasse, Strassburg. (*Archives of Otology*, Vol. XXXIII., No. 2). He reports the findings in seven cases of labyrinth disease complicating chronic middle ear diseases. In about half of the eases the extension of the inflammatory process from the tympanum to the internal ear was through the fenestra ovalis after destruction of the foot-plate of the stapes. Although necrosis of bone was noted in the simple cases of otorrhea, they were characterized more by a proliferation of tissue. In most of them there was an abundance of fibrous-tissue formation and the formation of new bone. In the one tubercular case there was no such tendency, the newly formed fibrous tissue was scant and was mostly transformed into cheesy material. Habermann had previously made the observation that tubercular cases could be recognized by their great tendency to bone destruction.

Campbell.

Report of a Fatal Case of Chronic Suppurative Otitis with Cholesteatoma in the Drum Cavity and Antrum, Cellulitis of Almost the Entire Scalp, Thrombosis of the Transverse Sinus, Cerebral Abscess and Softening of the Cerebellum.

GUTTMAN, New York. (*Archives of Otology*, Vol. XXXIII, No. 3.) These conditions developed from an otitis media suppurativa chronica of eight years duration. The most important and most pathognomonic symptom in these cases is undoubtedly the pyemic fever. Next in importance was the choked disc in the right and the optic neuritis in the left eye. The extensive cellulitis of the entire scalp extending to the eyelids and face, was rather a disagreeable complication as it made the diagnosis more doubtful and interfered with treatment. The cellulitis was probably an extension of the edematous swelling which appeared posterior to the mastoid in the region where the emissary vein emerged. This, the so-called Griesinger symptom, together with the lack of swelling in the anterior part of the mastoid is a valuable sign of intracranial complication. Not much stress must be laid on headache as it is purely a subjective symptom. The slow pulse which made its appearance toward the end of the disease pointed strongly to the necessity of exposing the brain. In fact, so strongly did the symptoms of sinus phlebitis overshadow those of brain abscess, that without the symptom of slow pulse the presence of brain abscess could not have been determined.

Conservative expectant treatment is not justified where suppuration is progressing in these regions; surgical interference is imperative. Where there is evidence that septic material is being carried into the circulation the jugular is to be promptly ligated. The mode and extent of surgical interference must always be adapted to existing conditions. *Campbell.*

Report of a Fatal Case of Multiple Otitic Abscess in the Temporal Lobe, with Remarks.

Jordan, New York. (*Archives of Otology*, Vol. XXXIII, No.3.) The patient, aged 39, had, from childhood, a purulent discharge from his left ear. 2 months before coming under observation he had pain in the ear with dull headache on the same side.. He kept on working till about a week before entering the hospital when he complained of vertigo, drowsiness and his temperature reached 100°F. Eye examination negative.

Radical operation was undertaken, about 2 drams of pus esaped under pressure from the attic; attic and antrum were lined by the discolored necrotic granulation tissue. There was a defect in the tegmen tympani 12x7 mm. The dura was dark, did not pulsate or bulge into the opening. A carious erosion was found on the prominence of the semi circular canal.

The operation occasioned no improvement in his condition, the right side of his face lacked tonus, drowsiness increased, optic neuritis developed, slow cerebration and sensory aphasia became more marked, so 2 days later the wound was extended upward and backward and a narrow-bladed knife inintroduced into the temporal lobe in several directions. At the depth of 1 inch an abscess was found and pus to the amount of 1 ounce escaped. After enlarging the wound, the cavity was loosely packed with iodoform gauze. Next morning patient's condition was still unimproved; removal of the gauze liberated about 1 dram of pus, so a rubber tube was inserted. Four days later an abcess at a much greater depth was evacuated but stupor increased with total right hemiplegia, dilatation of right pupil, severe hiccough. By lumbar puncture 1 ounce of clear cerebro-spinal fluid was withdrawn with temporary good effect. It contained no corpuscular elements or bacilli. 48 hours later the temperature ran up to 103.4°F, he became deeply comatose and died.

Section through the left temporal lobe showed 4 distinct abscess cavities with disintegration of brain tissue extending into the lenticular, into the internal capsule and into the median part of the parietal lobe. The final collapse and deep coma was due to an extensive hemorrhage into the pons and fourth ventricle. *Campbell.*

Operative Opening of the Mastoid Bone in Otitis Media Purulenta with Extension of the Disease Beneath the Mastoid Process.

LEIMER, Munich. (*Archives of Otology*, Vol. XXXIII, No. 3.) In 97 cases of acute middle suppuration with mastoid complications requiring operation 17 of these were cases of Bezold's mastoiditis. While ordinary mastoiditis most frequently occurs during the first three decades of life, Bezold's variety is found most frequently in the third, fourth and especially the fifth decades. The greater portion of the mastoid region usually remains free from swelling and tenderness while the inflammatory process shows itself below the oblique line of insertion of the muscles at the mastoid process and filling up more or less the retro-maxillary fossa.

Opening of the mastoid is begun by applying the chisel low down at the very tip of the mastoid process and separating the insertion of the attached muscles. The outer cortex is removed, the antrum exposed at its posterior end and then the rest of the mastoid process removed including the large cells which extend inward beyond the mastoid groove. The periosteal elevator is then pushed in above the soft parts underneath the base of the cranium in order to open any pus cavities there, and if there are accumulations of pus lower down in the neck a counter-opening should be made at the most dependent point *Campbell.*

II.—NOSE AND NASO-PHARYNX.

Nasal Fibroid.

WOOD, Nashville. (*Archives of Otology*, Vol XXXIII, No. 3.) A girl, aged 15, for two years has had nasal obstruction, frequent nose-bleeds and progressive facial deformity. In the early months pain about the face and forehead was so severe as to confine her to her bed for 3 months. It later subsided and has not since been a prominent symptom. For

6 months past the tumor has protruded from the left nostril in the form of a red from mass, one inch in diameter and disposed to bleed on manipulation. The separation of the eyes and flattening of the nose has produced typical frog-face. By the rhinoscope a red mass was seen protruding backward into the naso-pharynx.

On operation a preliminary tracheotomy was done and the pharynx tamponed. The external incision was made, exposing the left nostril and the tumor removed in two parts. The pedicle was attached to the under surface of the body of the sphenoid and the upper edge of the vomer over an area 2 in. horizontally and 1 in. vertically. The outer bony nasal wall, the lateral mass of the ethmoid and all the turbinals had disappeared. The tumor occupying the whole left nasal fosa and antrum of Highmore.

The patient reacted badly and died from surgical shock 22 hours after operation. *Campbell.*

Contribution to the Pathology and Treatment of Diseases of the Accessory Nasal Cavities.

Roepke, Solingen. (*Archives of Otology*, Vol. XXXIII, No. 1).

2. Three cases of empyema of the accessory sinuses. The caseation in all three cases was probably due to obstructed drainage After removing the diseased tissue recovery quietly followed

2. A case of pneumatocele of the frontal sinus brought about by occlusion of the naso-frontal duct, probably the remnant of an inflammatory infection of the right half of the nose.

3. A case of fetid purulent frontal sinus empyema with the production of crusts in a pronounced case of rhinitis. This case of atrophic rhinitis occurring on a scrofulous basis, aggravated by factory dust, had extended through a patulous naso-frontal duct to the frontal sinuses.

4. A case of fronta sinus suppuration following a pistol wound, and extraction of the bullet from the naso-frontal duct. *Campbell.*

Preparation and After Treatment in Nasal Operations.

H. Beaman Douglass, New York. (*Post-Graduate*, May, 1904). Dr. Douglass thinks the same preparation should be made for nasal operations as for the operations in general surgery.

Cleanse the nose carefully externally, washing the integument of the nose and cheek with soap and water and thoroughly scrubbing. Gauze compresses may be placed over the moustache and held in position with strips of rubber plaster; cut away hair at the entrance to the nostril.

Three hours before the operation wash the interior of the nose first with peroxid of hydrogen 1-10 with spray, and then with weak saline solution. If much mucus or pus is in the nose, ten drops of tincture of green soap in a quart of water should be used as a douche, followed by weak alkaline solutions. The irrigating fluid should be 102 to 106 degrees and of proper density; a teaspoonful of salt to the quart will do this. It should be irrigated with little force and through the obstructed nostril.

Boil all instruments from 15 to 20 minutes. The hands of the operator are treated as in major operations. The operator and patient are gowned in sterile dress and all towels freshly sterilized.

Whenever adjusting head mirror, do it with the hand covered with a sterile towel.

Solutions used for anesthesia must be fresh and sterile. To anesthetize, spray first and then put in pledgets soaked in 4 or 5 per cent. cocain solution mixed with suprarenalin. A pledget of cotton soaked in 4 per cent. solution of cocain and placed under the upper lip against the spine of the superior maxillary bone intensifies the local anesthesia.

The best after results are obtained from the use of antiseptic powders and non-interfering plan of treatment.

Bleeding from the septal veins is the most frequent form of epistaxis. The vessels here bleed very freely if only slightly disturbed; and the hemorrhage is sometimes very prolonged. Pressure, peroxid of hydrogen, 1-1000 adrenalin, torsion, if artery can be grasped, electro-cautery, are the methods to employ.

After tonsillotomy wait fifteen minutes for the cessation of hemorrhage, during which time the patient gargles with a solution of peroxid of hydrogen. If the artery is spurting from the center of the tonsil, catch the bleeding point and twist the artery. This is the only method really worth using in cases of arterial hemorrhage. If the hemorrhage is not arterial, and persists after fifteen or twenty minutes cauterize with the electro-cautery or else sew the cut surfaces of the tonsil together. If the hemorrhage continues over half an hour the patient generally faints from loss of blood and this serves to check the hemorrhage.

Richards.

Empyema of Frontal Sinus, Followed by Extradural Abscess and Abscess of Frontal Lobe. Operation and Death from Hypostatic Congestion of the Lungs.

PAUL S. MERTINS, Montgomery, Ala. (*The American Journal of Medical Sciences*, April, 1904.) The patient was a boiler-maker, 40 years of age, and had suffered for six months from violent headaches steadily increasing in severity until a swelling the size of a goose egg appeared in the region of the glabella. It was white, fluctuating, very tender, and had a hard rim with thickened periosteum. There was a history of syphilis sixteen years ago, and two years previously a blow from a hammer on the top of the head from which he was unconscious for several days. The abscess was incised and one ounce of foul, dark colored pus was evacuated. This was followed by complete relief of pain which returned the third day. When the head was held forward the flow of pus increased and the pain became less. Vomiting followed a few days later and there were three convulsions.

When first seen by the author, patient was in bed suffering greatly. Cerebration was slow but relevant; no paralytic phenomena; pupils small, equal size, and reacted well; patellar reflexes good; hand grasp strong; no rigors. The anterior end of the middle turbinate was greatly swollen. Temp. 97.5; pulse 78; respiration 20.

On probing the wound necrosed bone was found, and in several places the probe seemed to enter the cranial cavity. Diagnosis of extradural abscess was made, and on the following day a three-inch incision was made in the integument of the forehead, through the seat of the abscess. The pericranium had been dissected from the bone by the abscess, and on its being drawn back by retractors, an area of necrosed bone the size of a silver dollar was exposed. It was a dark brown color and presented the appearance of a pepper-box top from the numerous fistulae from which pus oozed at each respiration. A half-inch trephine was applied to the center of the necrosed area, and on the removal of the button, an extradural abscess containing about one ounce of pus was found. The dura was adherent to the frontal bone all around, and formed the bed of an abscess. Removing the necrosed bone opened the left frontal sinus, and about one-half ounce of pus was found in it. The right frontal sinus was opened and found to be healthy. The dura appeared to be very thick; was of a dirty, yellowish color and pulsated only on the left side. No fistulae could be found. A hollow needle was introduced on both sides with negative result on the left side, but with the finding of four or five drops of pus on the right as the needle was withdrawn. The wound was irrigated and iodoform gauze dressing applied. The next eight days the wound was dressed daily, urine frequently passed involuntarily; great irritability with semistupor; transient paresis of the right internal rectus, and optic neuritis on the right side. The right frontal lobe was then aspirated as the patient seemed to be in more than usually stupid condition. On introducing the aspirating needle in the right frontal lobe the depth of three-quarters of an inch it was felt to enter a cavity and pus flowed into the aspirator. The opening was enlarged and one and one-half ounces of creamy pus and a yellowish lump of broken-down brain tissue were evacuated. Iodoform gauze drain was inserted. There was immediate improvement in the patient's condition.

There was steady improvement for the next six days, the abscess cavity growing smaller and the discharge less. At this time there was a marked change in the condition with hypostatic congestion of the inferior lobe of the right lung, and coughing up of blood. Three days later the left lung became involved and all the conditions much worse. Death occurred two days later from exhaustion following the pulmonary conditions rather than directly from the abscess.

At the autopsy a depressed fracture the size of a hammer-head, about one-half inch deep was found on the left tem poral bone near the sagittal suture. The bone underneath was healthy. On removing the calvarium, the dura was found adherent around the original trephine opening, both to the bone and to the brain. The membrane appeared normal. The brain appeared normal except at the point of operation where an opening 1 cm. in diam. led into the abscess cavity. The abscess was entirely walled off by a thick lining membrane, and the brain tissue about the abscess was in a nearly normal condition. The inferior lobes of both lungs were in a condition of hypostatic congestion and in the right lung there was a cavity the size of a walnut filled with clotted blood.

The author regards the abscess as the direct result of the empyema of the frontal sinus, the posterior wall of the sinus being necrosed and a fistulous tract leading from the sinus to extradural abscess. *Richards.*

Treatment of the Suppurative Diseases of the Accessory Sinuses of the Nose.

E. Fletcher Ingals, Chicago, Illinois. (*Illinois Medical Journal*, 1904.) For suppuration of the antrum Ingals prefers in the majority of cases Hunter's method, that is, the removing of the last bicuspid or first or second molar, or the opening made through the space left by a tooth already lost.

A conical bone drill 6 mm. in diameter or a diamond point drill-trephine of the same size is used, and under cocain this operation is nearly painless. A gold tube can be fastened with clamps to the adjoining teeth. He prefers, however, rubber tubes 6 mm. in diameter, 19 to 35 mm. in length, and with a calibre of 4 mm.

The cavity is kept clean by washing it out with watery solutions of 50 per cent. hydrogen peroxid or boric acid, and injecting once a day a 5 per cent. solution protargol or 20 per cent. argyrol or one to 5 per cent. solution of zinc sulphate. If this treatment does not succeed within three or four months, the advantages of a radical operation through the canine fossa should be urged upon the patient.

The operation with immediate closure of the canine fossa wound is preferred. It is especially important in curetting the roof of the cavity not to injure the infraorbital nerve, and also that all angles and recesses be cleared of all diseased tissue. After the curetting is over, the cavity is swabbed with 95 per cent. carbolic acid and lightly packed with iodoform gauze.

Acute inflammation of the ethmoidal cells is treated with a spray containing two grains of cocain, 1/10 grain of suprarena in, eight grains of boric acid to the ounce of water, thoroughly applied several times daily. With chronic cases, all obstructions are to be removed and free drainage obtained as far as possible. In operating upon the ethmoid cells great care should be exercised not to break through the cribriform plate.

Affections of the sphenoidal sinus are probably very generally overlooked as the normal opening of this sinus is so high up that it is impossible to employ treatment effectively through it, and in the majority of cases it is not practicable to inspect the normal opening of this cavity until the posterior end of the middle turbinate has been removed. This being done, the anterior wall of the sinus may readily be inspected if the nasal cavity is of normal size. The anterior wall of the sinus may be opened by hook or forceps, trocar, sharp spoon, punch forceps or trephine. The trephine makes the smoothest opening and is to be preferred. Cure may be expected in from two to four months.

In suppuration of the frontal sinus Ingals uses a guarded pilot burr which is used from within the nose. The pilot is a flexible steel wire, and may be used straight or bent in any direction, and long enough so that it will project 5 mm. beyond the end of the burr when the burr has been slid over it. He also has a longer pilot which will project 9 mm. beyond the burr, so as to prevent any possibility of its working down from the frontal sinus when the canal is being enlarged. Before using this burr in the anterior part of the nose there should be thorough removal of any obstruction in the naris. He has been able to make a good sized opening into the frontal sinus through which gauze can be packed. The patient is anesthetized with chloride of ethyl, the operation requiring but a few seconds, four to six.

For the radical external operation he recommends that the incision extend from the junction of the middle and inner third of the supraorbital margin in a curved line forward and downward to the root of the nose, about 6 mm. above the level of the internal canthus. The periosteum being divided, the opening is then made with the chisel and mallet; the cavity thoroughly cleansed of all disease; the wound swabbed with 95 per cent. carbolic acid; the naso-frontal canal enlarged by a Krause trocar guided by the little finger introduced into the nostril. The original incision is entirely closed, a gauze strip left in the wound coming out into the nose. The external wound is then closed, partly or completely, and an antiseptic dressing applied. If there is no fever and the dressing appears sweet, the packing may be left in the sinus for six or seven days, being then removed through the nose.

The more radical operation of Killian is briefly described. Recurrence of suppuration sometimes takes place and may necessitate a second or third operation. This statement probably refers to the results of the Caldwell-Luc operation, as after operations in which the sinus is completely obliterated it is doubtful if recurrences occur. *Richards.*

The Removal of Septal Spurs and the Correction of Deviations of the Septum by More Rational Methods.

Charles Nelson Spratt, Minneapolis, Minn. (*American Medicine*, May 7, 1904.)

Resection of the Nasal Septum for Correction of Deflections.

Willis S. Anderson, Detroit, Mich. (*The Physician and Surgeon*, March, 1904.) The methods advised are practically the same as those of Freer and White, in the papers of which the operation is discussed more in detail. Spratt thinks Freer's elaborate instrumentarium unnecessary, and himself uses the chisel for the most part. He thinks that a Fraenkel-Swift speculum, a Sajous knife, a small elevator for the flap, a thin chisel, a pair of Heymann cutting forceps and plenty of cotton swabs are all the instruments that are necessary.

He holds the flap in position by a spatula, and packs the nose lightly with iodoform gauze for twenty-four hours, replacing this then by fresh gauze, and finding after forty-eight hours that the flap is quite firmly attached to the septum and subsequent packing is unnecessary.

Anderson packs both nostrils with strips of lint impregnated with subnitrate of bismuth, packing the formerly obstructed side firmly and the free side loosely. Perforations occurred in some of his earlier cases but he thinks that after thorough familiarity with the technique of the resection operation, the perforation should occur but rarely.

Richards.

Salpingoscopy.

JOSEPH C. BECK, Chicago, Illinois. (*Medical Journal*, 1904.) The salpingoscope is an instrument for examining the region of the Eustachian tube and naso-pharynx, and consists of a tube with an ocular piece at the proximal end and a prism mounted by a light with a small curve at the distal end. Electricity is the source of illumination and is turned on or off by a switch on tbe handle of the instrument. It is introduced the same as the Eustachian catheter, being thoroughly cleansed and the prism covered with lysol or soap so as to prevent steam from covering it like a laryngeal mirror.

The eye is placed to the eye-piece and contact made by turning on the switch, then by moving the instrument gently forward and back, the outline of the ostium tubis with its anterior and posterior lips, is seen. As one is looking through a prism, the image is an inverted one, while the parts situated close to the prism appear very large, and those farther away, extremely small. Both openings of the tubes can be seen through one nostril.

The author has used it in a great variety of conditions and has found that it is an aid in diagnosis worth applying; that it requires considerable time to familiarize oneself with the technique and to learn the comparative sizes of the structures, and that its use is particularly of the value in the naso-pharynx in examination of the ostium tuba.

The salpingoscope was introduced by Valentine, whose article may be found in the Arch. f. Laryn., 1903, Bd. XIII, Heft. 3. *Richards.*

III.—MOUTH AND PHARYNX.

The Submerged Tonsil.

THOMAS J. HARRIS, New York. (*Medical News*, July 9, 1904.) The submerged tonsil, even though hypertrophic and well below normal may give rise to a not insignificant group of symptoms such as peritonsillar abscess, non-suppurative tonsillar inflammation, pain in the form of sore throat, constant collection of mucus in the larynx, difficulty in using the voice, and occasionally, in the case of extensive adhesions, certain ear symptoms, the most common of which is earache. It is also a causal factor of considerable value in chronic catarrhal otitis. Since the attachment of the muscles known as the anterior and posterior pillars are in close relation to the pharyngeal mouth of the Eustachian tube, and as in the case of adhesion of these pillars and the tonsil all normal movement is restricted or lost, pressure of such a tonsil must of necessity interfere somewhat with the proper blood supply of the Eustachian tube.

Cough may be a most annoying sympton without expectoration; may have existed for months and may defy all internal medication. There is often an associated dyspepsia, with coated tongue and inactive bowels. The writer thinks that the average tonsillotomy is an incomplete operation, as most physicians have been in the habit of removing any excessive tissue which is present and then desisting. The case then passes out of sight, but in after years returns complaining of quinsy or some of the other symptoms enumerated or diphtheria. As a result, the lay or professional man has been led to the conclusion that tonsillotomy was without avail.

The treatment is essentially surgical. All medication is of no avail. The tonsil should be freed from its adherent tonsillar pillar, and if necessary, from the posterior pillar, and removed in whole or in part. The freeing from the pillar is an indispensable step in the operation. The plica triangularis will often have to be cut loose in order to free the gland.

The author uses cocain, first painting with 10 per cent. solution and then injecting 10 to 15 m. of one-half to one per cent. solution. He prefers the tonsil punch to any of the other instrument although the tonsil can be removed with a variety of instruments. He has had no experience with the electro-cautery method of Pynchon. The chief concern is to avoid cutting the tonsil pillar. With the punch there is but little hemorrhage.

Only one tonsil is operated on the same day, and for the pain and discomfort which follows, orthoform in the form of an emulsion or five grain tablet is used. The other tonsil is removed one week later. *Richards.*

Lingua Nigra.

Joseph C. Beck, Chicago, Illinois. (*Medical Journal*, 1904.) The patient was 34 years old with a history of muscular rheumatism for several years; complained of a peculiar scratchy feeling in his throat near the back of the tongue, about one year's duration, worse in the recumbent posture. On examining his throat he noticed on the back of his tongue a dark mass which he attempted to wash off, and not succeeding, pulled off in pieces with a spoon, but it soon returned in the same locality.

On examination there was found a dark mass of a dirty brownish color, broadest at the base of the tongue at the circumvallate glands, gradually disappearing down to a point at the anterior third of the tongue. On removal the mass was found to be composed of a number of filamentous hairs, dark in color, having all the appearance of hornified epithelium which did not take stain well. The color of hairs was due to the aged condition of the epithelium, and its hornification, a constant increase of the normally present pigment. It is a combination of hyperkeratosis and pigmentary growths.

The local application of a 10 per cent. alcoholic solution of salicylic acid or 10 per cent. solution bichloride of mercury was the treatment, together with the curette. Strong solutions of peroxide of hydrogen may also be used.

Richards.

Hemorrhage After Tonsillotomy; Its General Consideration.

H. Jarecky, New York. (*Medical Record*, April 30, 1904.) After the eighteenth year hyperplastic changes take place in the tonsil that has been the seat of repeated inflammations, causing the interstitial fibrous tissue to increase, and preventing the retraction of the blood vessels. This explains why hemorrhages rarely occur in children. Vessels which are cut slantingly are more apt to bleed than where they are cut squarely across.

The removed tonsil should be examined to see whether it shows the presence of any large artery which may require immediate treatment.

The wounding of the anterior pillars can always be avoided by separating them from the tonsil by means of a blunt hook. Bleeding from wounding the pillars is slight but usually persistent. It can be controlled with the galvanocautery.

Ulceration is usually the cause of secondary hemorrhages. After operation it is important that nothing be taken that will scratch the wounded surface or that is any way difficult of digestion.

Fibrous tonsils ought to be removed with the cold wire snare.

Cases of bleeding have been reported after all methods of operation. The author reports two cases of secondary hemorrhage, due probably to an injury to the plexus of veins at the base of the tonsil. If the bleeding does not cease spontaneously in a few minutes after the operation measures should be taken to a stop it. A hypodermic of morphia often acts like a charm. If one or two vessels cause the trouble they should be seized with forceps or tenaculum and twisted, while if the bleeding is from the whole surface of the tonsil or venous oozing, the Paquelin or galvanocautery should be applied. In persistent uncontrollable hemorrhage two ligatures can be passed from the posterior pillars through the anterior ones, and then tied so that the tonsil is folded on itself or a recess formed in which gauze can be packed. There is little danger of injuring the internal carotid artery with the ordinary tonsillotome.

In case of bleeding use a good light and clean the parts to ascertain the cause; anesthetize or use morphine to quiet the patient; and never operate without being prepared to cope with hemorrhage. *Richards.*

IV.—LARYNX.

Further Experiences with Intratracheal Medication.

P, S. DONNELLAN, Philadelphia. (*American Medicine*, May 14, 1904.) Donnellan's first report is dated December 18, 1901. Since that time he has found intratracheal medication to be of great value in cases of pulmonary tuberculosis inasmuch as medicines can be introduced through the trachea without disordering the stomach and with quick absorption. In suitable cases the expectoration is diminished, the heavy masses of muco-pus being replaced by frothy mucus in which the tubercle bacilli are less numerous and are occasionally absent.

The injections are given daily at first and then at longer intervals. Pure olive oil, distilled glycerine and any of the fluid petroleum oils make good menstrua. Creasote, menthol, guaiacol, camphor, codein, and iodoform are used in accordance with the amount of cough and the individual symptoms.

He uses a specially devised syringe of glass with a metal ip. The reviewer has used this syringe to some extent. While it answers the purpose very well, it is readily breakable at the point where the syringe screws into the metal laryngeal tip. A syringe with a metal barrel and an asbestos plunger would seem to answer the purpose better and be quite as easily sterilized.

Dr. Donnellan reports a number of cases showing benefit from the injections. *Richards.*

The Larynx in Beginning Pulmonary Tuberculosis.

W. G. B. Harland, Philadelphia, (*American Medicine*, June 25, 1904), reports some cases showing the practical value of an examination of the larynx in beginning tuberculosis of the lungs, and thinks that in all cases of suspected lung trouble, even when the evidence on physical examination is insufficient, that an examination of the larynx should also be made, as this examination may give the first clue to the presence of the lung infection. Should the larynx be the chief seat of the disease, the diagnosis and prognosis must be founded on the local appearances present.

The diagnostic import of the lesions observed in the larynx will depend somewhat upon the findings found after a careful study of the case as a whole. The larynx changes observed early in tuberculosis of the lungs may be congestive or anemic. In the congestive cases there is apparently a somewhat persistent sub-acute laryngitis with reddening of one or both cords; due partly to cough and partly to infection of the deeper under lying tissues of the mucosa by tubercle bacilli. Such changes are more frequent when the tuberculosis infection has followed grippe or a series of colds. In the anemic cases there is a general pallor of the mucosa of the larynx. The tongue is covered with a whitish coating, indicative of gastro-intestinal disorder, and the veins at the base are swollen. The vocal cords may appear congested or may be very pale. The tissues are often pale from edema.

The well-known more characteristic lesions of the disease appear later. *Richards.*

V.—MISCELLANEOUS.

Yohimbin; Its Use in the Treatment of Eye, Ear, Nose and Throat Diseases.

J. H. Claiborne, New York, and Edward B. Coburn, New York. (*Medical News*, July 9, 1904.) So far as the ear, nose and throat are concerned, Dr. Coburn has ascertained that a two per cent. solution of yohimbin appreciably benumbs the mucous membrane in two minutes; produces marked anesthesia in five minutes and the maximum degeee of anesthesia in ten minutes. This anesthesia lasts from one-half to three-quarters of an hour, sensation then gradually returning, and being completely restored in one and one-half hours. It affects the mucous surface only.

On being applied to the turbinals in the nose there was at first temporary swelling with considerable hyperemia, followed by some contraction of the tissues. On the tonsils, uvula and faucial pillars little change was noted except slight flushing. There was at first salivation, followed by dryness, but no puckering or constricted feeling as after the use of cocain.

Mixed with equal parts of 1-1000 adrenalin chlorid and applied to the turbinals there was considerable contraction of the tissues, not so marked as with adrenalin alone but much more so than with the yohimbin solution alone. As compared with cocain, the pallor, anesthesia and contraction of the tissues is not nearly so pronounced. Used for nasal operations the hemorrhage was more marked than when cocain was used, and the sensation not as thoroughly obtunded.

Secondary hemorrhage did not occur.

Cauterization of the tonsils to which yohimbin had been applied was rather painful.

Its advantages are that it is non-toxic; the anesthesia is of long duration, and it does not markedly contract the tissues; its taste is only slightly bitter, and it does not cause complete contraction of the throat and mouth.

Its disadvantages are that it does not keep well; it does not contract the tissues; there is some hyperemia and hemorrhage after operation, and it produces salivation.

Richards.

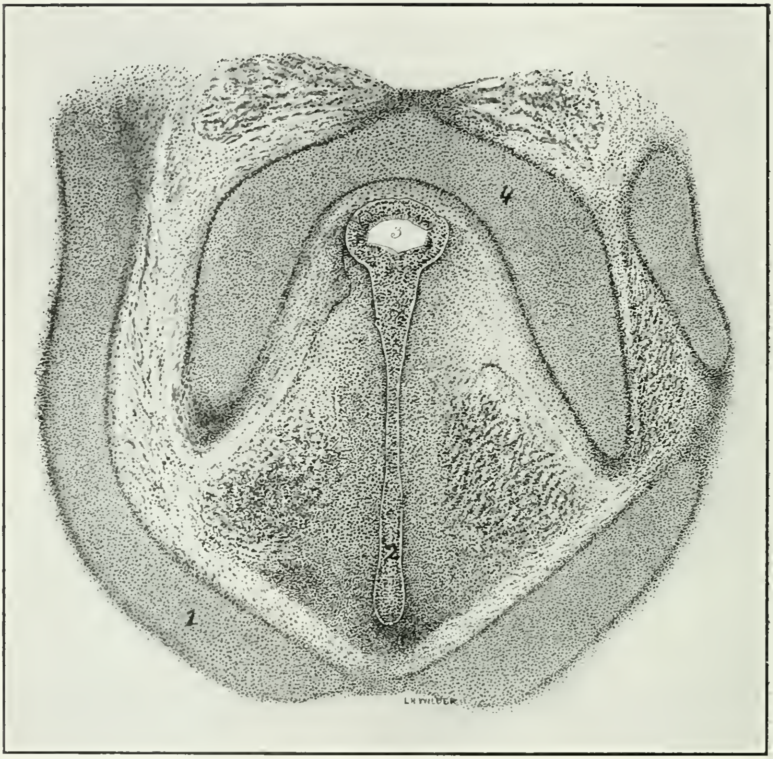

FIGURE IV.

Transverse section through the larynx of an embryo pig 45 m m. long, below the plica vocalis.

1. Thyroid cartilage.
2. Concresced epithelium (still intact).
3. Dorsal space.
4. Cricoid cartilage.

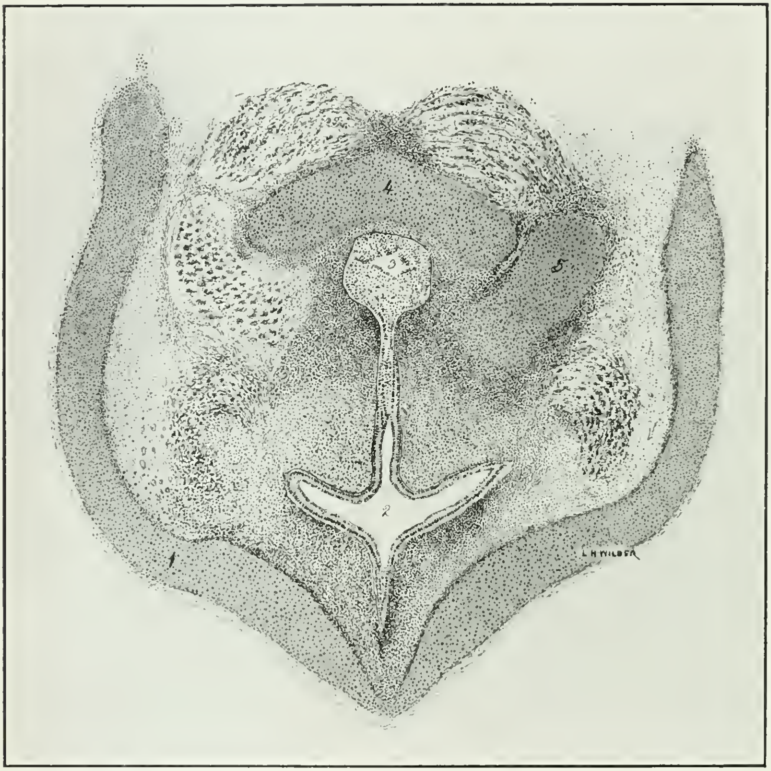

FIGURE III.

Transverse section through the larynx of an embryo pig 40 m m. long.

1. Thyroid cartilage.
2. Ventral space, which by the separation of the concresced epithelial surfaces is extending dorsalward.
3. Dorsal space.
4. Cricoid cartilage.
5. Lower part of the arytenoid cartilage.

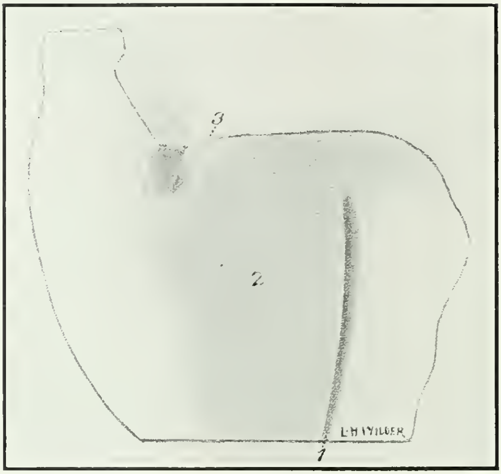

FIGURE II.

Reconstruction in wax of the larynx of an embryo pig 14 mm. long, enlarged 66 2-3 times. The reconstruction has been divided in the sagittal plane to show the area of concrescence.

1. Dorsal space communicating with the tracheal lumen below. The cephalic extremity is occluded by the concrescence.
2. The shaded area shows the extent of the concrescence.
3. Ventral space (aditus laryngis).

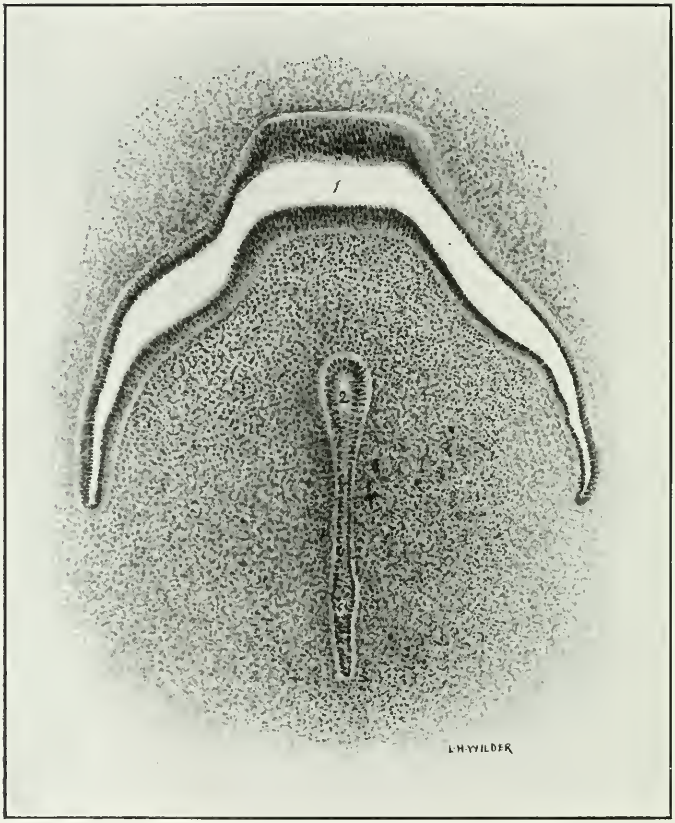

FIGURE I.

Transverse section through the larynx of an embryo pig 14 m m. long.

1. Cavum pharyngis.
2. Dorsal space, which is occluded above by the proliferation of the epithelium of the interarytenoid incisure; below it is continuous with the tracheal lumen.
3. Concresced epithelium.

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XXX.

THE EPITHELIAL CONCRESCENCE IN THE LARYNX OF THE FOETAL PIG.

By Dean D. Lewis, M. D.

CHICAGO.

One of the interesting problems connected with the embryology of the larnyx is the development and disappearance of an epithelial concrescence by which the future cavum laryngis is temporarily occluded. The extent and significance of this concrescence and the factors concerned in its production and disappearance have been variously interpreted by different investigators.

In studying a series of tranverse sections through the cervical region of the fœtal pig, several points are suggested, which have a direct bearing upon this subject. The conditions found in the pig vary considerably from those described in the human embryo. While it is impossible to draw conclusions in regard to the human embryo, from the study of the pig, the conditions found in the latter are instructive.

Roth[1] first called attention to the fact that the masses forming the laryngeal anlage are in certain stages of their development united to each other by an epithelial tissue. He describes this epithelial concrescence as not being limited to the aditus laryngis, but as extending as far caudalward as the future rima glottidis; even as far as the beginning of the trachea. In his description he mentions a small space in the posterior part of the epithelium, which he regards as the origin of the laryngeal cavity. This space is seen in figure 1. He describes small accessory openings, which by confluence become larger and result in the formation of a lumen and states that the process of opening always begins dorsally and extends toward the ventral side of the embryo.

Roth, as was later shown by Koeliker[2], was in error regarding the origin of this epithelial tissue, as he considered it to be the remains of an epithelial membrane, which in early stages separates the mouth cavity from the foregut.

Putelli[3] mentions an epithelial concrescence in the region of the ventriculus laryngis of the embryo dog.

Kallius[4], in summing up his conclusions upon the embryology of the larynx, states that it is difficult to interpret the significance of the extensive epithelial concrescence in the fœtal larynx; that in the stages examined by him there is always present a small posterior opening, which communicates with the pharynx above and the trachea below. He thinks it difficult to say whether the concrescence is dependent upon the rapid growth of the arytenoid anlage, or whether by it the lateral walls of the larynx, originally projecting into its lumen, are flattened and moulded into their definitive form. In any case, phylogeny offers no analogy. It is a cænogenetic process, and differs from any other known structural plan.

Fein[5] has recently reopened this discussion, differing from Kallius as to the extent of the concrescence, in stating that the laryngeal cavity is completely occluded, and that the posterior space formed in the young embryo does not communicate above with the pharyngeal cavity. He suggests a plausible theory to explain the formation of the concrescence, and describes the process by which it disappears. The conditions in the pig do not correspond entirely to those described by either Kallius or Fein as found in the human embryo, but suggest the factors upon which the disappearance of the concrescence is dependent, and the manner in which it proceeds.

For this study, transverse sections of fœtal pigs of different lengths were mounted serially. In all cases the vertex coccyx measurement was taken. Hæmotoxylin was used as a nuclear stain. Congo red and eosin as a counterstain Only those stages will be described which have a direct bearing upon the subject under discussion.

DESCRIPTION OF THE DIFFERENT STAGES.

Foetal pig, 5mm. length.

The larynx is represented as a hollow evagination from the ventral side of the foregut. The epithelium of the evagination is proliferating, as is indicated by the number of mitoses. The cells of the two sides are distinct from each other, and have not yet met in the median line. The trachea is not yet separated from the foregut.

Foetal pig, 7mm.

The epithelial evagination has increased in its dorsoventral diameter. In the ventral part of the evagination the epithelial layers of the two sides are approximated in the median line, but the epithelium of each side can still be distinguished. A median line staining heavily with eosin marks the separation. At this stage concrescence has begun, but it involves only the anterior part of the evagination. A V-shaped space is found in the laryngeal anlage, the apex of which is directed ventralward, meeting concresced epithelium. The space between the limbs of the V opens posteriorly into the foregut. As the trachea is approached the approximated epithelial surfaces separate to form a distinct lumen, which communicates with the trachea below. At this stage the trachea is formed.

Foetal pig, 9 mm.

The next important stage shows the development of the interarytenoid fold and a small posterior space in the concresced epithelium. In Fig. 1 representing a transverse section through the larynx of a 14 mm. pig, this posterior space may be seen. It is difficult to say at what level this posterior space is formed, for as yet there is no differentiation of the parts of the larynx, which can be used as guides. Cephalad, the apices of the arytenoid anlage are separated, and the V-shaped space mentioned in the 7 mm. stage is seen.

In sections passing caudalward a proliferation of the epithelium upon the medial side of the arytenoid anlage, near their apices, is found. By this proliferation the limbs of the V-shaped space, which represents the interarytenoid incisure, are united posteriorly. The space between the limbs of the V remains as a distinct opening, but the epithelium of the laryngeal anlage is still continuous with the epithelium of the foregut. Still more caudalward the proliferating mesenchyme of each side meets in the median line dorsally, and the epithelium of the laryngeal anlage becomes separated from that of the foregut. This small posterior space represents the beginning of the laryngeal lumen. It communicates above by means of the V-shaped space between the arytenoid anlage with the foregut, and below with the trachea. In this stage the conditions correspond to those described by Kallius in the human embryo. There is a distinct space in the laryngeal anlage posteriorly, which communicates with the foregut above and the trachea below. Fein, in his description, makes no mention of a corresponding condition.

No important changes occur in any succeeding stage up to the 14 mm. In this stage many are noted which demand careful consideration, as they determine the extent of the concrescence and the manner in which it disappears.

Foetal pig, 14 mm.

The arytenoid cartilages have attained their definitive form. Their apices are united dorsally by a thin layer of epithelial tissue. Ventrally they separate to form the postero-lateral boundaries of a ventral space, which is the aditus laryngis. The anterior boundary of this space is the epiglottis. The ventral opening extends caudalward through a few sections, and then disappears, being replaced by a concresced epithelium. The epithelium lining the ventral opening consists of a single layer of cubical cells. The arytenoid cartilages are united upon their medial surfaces by a mass of epithelial tissue. It is impossible to make any estimate of the number of layers of cells at this level. The epithelium here has proliferated greatly. In the 13 mm. stage the V-shaped space, incisura inter-arytenoidea, is still seen, while in the 14 mm. stage, by the increase in the size of the arytenoid cartilages and the proliferation of epithelium upon their medial surfaces, it has been reduced to a shallow depression. In sections passing caudalward the small posterior space is found, but it no longer communicates with the pharynx, as in the previous stages. Its upper opening is occluded by the thickened and concresced epithelium upon the medial surfaces of the arytenoid cartilages; caudalward, it still communicates with the trachea. It does not increase in its ventral diameter, and in this stage at least takes no active part in the separation of the concresced epithelial surfaces. Figure 2 represents the reconstruction in wax of the larynx of a 14 mm. pig, enlarged 66 2-3 times. The ventral and dorsal spaces are seen, but they do not communicate with each other. The future cavum laryngis is occluded.

At this stage the conditions correspond in part to those described by Fein in the human embryo. In his reconstruction upon paper he represents two cone-shaped openings. The apex of the upper cone corresponding to the ventral opening above described, is directed caudalward and ventralward. The apex of the lower cone is directed cephalad and dorsalward. These two apices are separated by a layer of concresced epithelium. The representation of the ventral space corresponds to the condition found in the fœtal pig. The dorsal space in the pig, however, has no ventral extension, and Fein's representation of an open space corresponds to an area of concrescence in the pig.

In this stage there should be noted, especially, the increase in the size of the arytenoid cartilages, and the thickening and concrescence of the epithelium of the incisura interarytenoidea, which occlude the pharyngeal opening of the posterior space. Kallius mentions the thickening of the epithelium at this level, but Fein has seen neither proliferating epithelial cells nor increased thickness of epithelial layers.

Foetal pig, 17 mm. length.

The ventral space is changing in shape and increasing in its transverse and longitudinal diameters. It is still lined by a single layer of cubical epithelial cells. Posteriorly the sagittal concresced area is seen. Surrounding the small posterior space, the epithelial cells form many layers, while anteriorly, near the ventral space, there is but a single layer on each side. The muscles and cartilages of the larynx are being differentiated.

Coincident with the differentiation of the indifferent mesenchyme into muscle and cartilage there occur important changes, which later result in the disappearance of the epithelial concrescence. While these changes are seen in earlier stages, they are best exemplified in the 27 mm. pig.

Foetal pig, 27 mm.

The cartilages and muscles are fully differentiated and the ventriculus laryngis has begun to develop. The larynx is enlarging symmetrically. The ventral opening has increased constantly in size, and the sagittal concresced area is well advanced in its process of opening. The opening progresses from the ventral to the dorsal side of the embryo, and is apparently dependent upon an expansive growth of the anterior laryngeal wall, which exerts a traction upon the concresced epithelial surfaces. Although solution of the concrescence is well advanced at this stage, no accessory openings are found which by confluence form a laryngeal cavity, as stated by Kallius and Fein to be the case in the human embryo. The opening into the ventricle shows no concrescence, but lateralward its epithelial surfaces are in contact. This is evidently a form of concrescence, but it is not extensive. Fein has not noted any concrescence in the ventricle of the human embryo. In the last stage described by him the concrescence has almost wholly disappeared, and the ventricle has not yet been formed. This does not preclude the possibility, however, that the epithelium of the ventricle may be partially concresced when it develops. Putelli has described an epithelial concrescence in the ventriculus laryngis of the dog.

In the 35 mm. stage, the changes which result in the disappearance of the concrescence are progressing rapidly, and while in subsequent stages these same changes are seen, but in different phases of development, a new process is also to be noted. Accessory openings have appeared in the epithelial tissue uniting the medial surfaces of the arytenoid cartilages, so that the epithelial concrescence is limited to the middle part of these surfaces. Anteriorly and posteriorly they have become separated. The opening of the concresced sagittal area, in sections farther caudalward, is seen to be extending dorsalward. The accessory openings by confluence form large spaces, by which eventually a communication is established between the small posterior space and the sagittal opening formed by a separation of the concresced surfaces. In Figure 3 a transverse section of a 40 mm. pig is seen. The section passes through the upper part of the cricoid cartilage. On the left side is the lower part of the arytenoid cartilage. In the median line the manner of opening of the sagittal concresced area is shown. At this level no accessory openings are yet to be found. The epithelial cells adjacent to the line of cleavage have a peculiar vacuolated appearance. Attempts at staining these with muci-carmin and muchæmatin were unsuccessful. While in the 50 and 60 mm. pig the solution of the concrescence above the plica vocalis is almost complete, below it the concrescence is intact. The posterior space which was formed in the 9 mm. pig has enlarged symmetrically with the growth of the larynx, but has not increased in its ventral diameter. The sagittal opening so far has progressed from the ventral to the dorsal side of the embryo, and never in the opposite direction, as described by Roth, and represented by Kallius in the human embryo.

Foetal pig, 70 mm.

In this stage that part of the laryngeal lumen above the labium vocale is formed. At the level of the upper border of the cricoid cartilage, while there is a separation of the epithelial surfaces, which extends from the ventral to the dorsal side of the embryo, there is also an extension ventralward of the dorsal space. By the union of these two openings a laryngeal lumen is established. In the upper part of the larynx the opening has proceeded from the ventral to the dorsal side of the embryo; in the lower part the ventral extension from the dorsal space plays an equally important role. This extension ventralward is apparently dependent upon the differentiation and expansion of the cricoid cartilage. Some concrescence persists even at this stage. It is most pronounced at a level, which corresponds closely to the inferior arcuate line of Reinke. Accessory openings are numerous in the epithelium at this level and the solution of the concrescence is undoubtedly dependent upon the confluence of these spaces and the subsequent union with the ventral extension of the dorsal space. Concrescence persists the longest along the inferior line of Reinke, as noted by Kallius in the human embryo, that is, at the level of the narrowest part of the laryngeal lumen, where the epithelium is least subject to a traction exerted by the rapid expansive growth of the walls of the larynx. The muscles and cartilages of the larynx are fully differentiated, but the epithelium does not as yet correspond to the adult type.

DISCUSSION AND CONCLUSIONS.

Time of formation of concrescence and extent: Kallius finds concrescence in the laryngeal anlage at a time preceding the separation of the trachea from the foregut. He finds this in a human embryo of 28 or 29 days. The youngest human embryo which Fein had the opportunity of examining measured 5 mm. in length, and was probably between 21 and 28 days old. In this stage he describes no concrescence or marked proliferation of epithelial cells. In the 9 mm. embryo, approximately four weeks old, he describes the beginning of concrescence.

In the 5 mm. pig embryo there is no evidence of concrescence, as the two halves of the laryngeal anlage are separated from each other dorcally. In the 7 mm. pig, however, the epithelial layers lining the evagination meet ventrally, and while the epithelium of each side may be easily recognized, for they are separated from each others by a lime stained heavily with easin, concrescence may be said to have begun at this stage.

We are justified in saying, I believe, that the concrescence reaches its highest development in the 14 mm. pig. In the 9 mm. stage, by the development of the interarytenoid fold, the small dorsal space is formed which communicates with the pharynx above and the trachea below. This opening is the beginning of the future cavum laryngis. Its extent varies with the stage examined. The conditions found in the pig from the 9 to the 14 mm. stages certainly correspond to those described by Kallius as existing in the human embryo. But in the 14 mm. pig, by the rapid growth of the arytenoid cartilages, and the proliferation of the epithelium of the incisura interarytenoidea, the cephalic opening of this posterior space becomes occluded.

Fein states that there is no considerable proliferation of epithelium in the incisura arytenoidea, a view contrary to that held by Kallius. In the pig the proliferation of the epithelium of this incisura is an important factor in the occlusion of the cephalic end of the dorsal space. From a study of the pig it is impossible to suggest any views which would reconcile the opinions of Fein and Kallius. Up to the 14 mm. stage the statement by Kallius: "Sondern es bleibt eine Kommunikation zwischen Rachen und Trachea bestehen, die, soweit ich gesehen habe, uberhaupt nie ganz schwindet," is true. Beyond the 14 mm. stage the conditions found resemble more those described by Fein, with the exception that the dorsal space in the pig does not extend so far ventralward, even in the late stages, as he represents. Both the condition described by Kallius and also that described by Fein in the human embryo are found in the pig, but in different stages.

With the appearance of the ventral opening, aditus larygis, the solution of the concrescence begins. The concrescence in its greatest development extends the whole length of the larynx, even to the beginning of the trachea, with the exception of the two spaces, the small dorsal and the larger ventral one. Figure 2.

Factors producing concrescence: Fein has interpreted the factors concerned in the production of the concrescence correctly. His conclusions are practically the same as those given by Tandler, to explain the epithelial occlusion of the fœtal duodenum. They are as follows—the laryngeal lumen in its dorso-ventral, and more particularly in its frontal diameter, does not keep pace with the growth of the laryngeal walls. These walls, composed of a dense mesenchyme, become thicker without extending much from the median line. It is only at the time in which the indifferent mesenchyme becomes differentiated into cartilages and muscles that an expansive growth occurs. The interarytenoid fold increases constantly in thickness, while the laryngeal lumen is closed.

Kallius virtually suggests the same explanation when he states that perhaps the concrescence is dependent upon a rapid growth of the arytenoid anlage. His alternative statement, that perhaps the laryngeal walls are moulded into their definitive form by this concrescence, is not plausible, for the non-resistant epithelial tissue would exert no pressure. On the contrary, the pressure exerted by the thickened mesenchyme, containing, potentially, cartilage and muscle, undoubtedly causes a collapse and concrescence of this non-resistant epithelium.

Factors concerned in the disappearance of the concrescence: No one factor is responsible for the disappearance of the concrescence. The manner in which the solution of the concrescence proceeds suggests the different factors which effect it. It has already been noted that the separation of the concresced surface in the upper part of the larynx passes from the ventral to the dorsal side of the embryo. The line of separation of the epithelium may be seen in Figure 3. At this stage the accessory openings described by Roth, Kallius and Fein, to which they attribute such an important role in the establishment of a laryngeal lumen, are not found. At a lower level, the upper border of the cricoid cartilage, the dorsal space begins to extend ventralward, to meet the dorsal extension from the ventral space. By the union of these two the laryngeal lumen is formed. The separation of the concresced epithelial surfaces may be explained mechanically. By the upward and lateral growth of the thyroid cartilage a traction is exerted upon the epithelial surfaces of the upper part of the larynx, and the separation extends from before backward. At a lower level the growth of the cricoid cartilage exerts an influence, resulting in a ventral extension of the dorsal space. It is only at the level of the cricoid cartilage that this dorsal space takes any active part in the formation of the cavum laryngis.

To the accessory openings described by Roth and Kallius may be assigned a secondary role. These openings are found only in the later stages, after the solution of the concrescence has well advanced. In sections, made at different levels, epithelial bridges are seen, which separate the frontal and dorsal spaces. By the liquefaction of the epithelium small spaces are found which, by confluence, become larger, and finally result in the union of these two spaces. At that level, where the concrescence persists the longest, these accessory openings are found in greater number, and are important in effecting a separation of the epithelial surfaces. Here, where the laryngeal wall undergoes the least expansive growth, the laryngeal lumen is established by the confluence of these accessory spaces and their union with the ventral extension of the dorsal space.

CONCLUSIONS.

1. Concrescence of the epithelium of the laryngeal anlage begins in the 7 mm. pig. In the 9 mm. stage a posterior space is formed in the concresced epithelium, which communicates with the pharynx above and the trachea below, corresponding to the condition described by Kallius in the human embryo. In the 14 mm. pig, by the rapid growth of the arytenoid anlage, and the proliferation of the epithelium of the incisura interarytenoidea, the cephalic opening of the posterior space is occluded, corresponding to Fein's description.

2. The concrescence is dependent upon the rapid growth of the mesenchyme of the laryngeal anlage, which compresses the less resistant epithelium.

3. The beginning of the solution of the concrescence is coincident with the differentiation of the mesenchyme of the laryngeal anlage into cartilage and muscle. In the upper part of the larynx the line of separation of the epithelial surfaces extends

from the ventral to the dorsal side of the embryo. The separation of the surfaces is apparently dependent upon an expansive growth of the upper part of the anterior laryngeal wall. At the level of the upper border of the cricoid cartilage the dorsal space begins to extend ventralward, to meet the space extending dorsalward. By the union of the two the laryngeal lumen is formed. The ventral extension from the dorsal space depends upon the growth of the cricoid cartilage. Accessory openings assist in the later stages in the formation of the lumen, especially in that region where concrescence persists the longest and the epithelium experiences the least traction. The cells immediately adjacent to the lumen have a peculiar vacuolated appearance, but they do not stain with muci-carmin or muchæmatin.

4. The plicae vocalis and ventricularis are well developed before the concrescence disappears. The lateral prolongation of the ventriculus laryngis is concresced in the early stages of its development.

5. The pig embryo is probably intermediate between the human embryo, in which the concrescence has disappeared before the ventricle has been formed, and those animals, such as the sheep and calf, having no ventricle, and in which concroescence persists the longest.

6. The persistence of this concrescence may result in malformations of the larynx, such as congenital diaphragm, in which case there should be, theoretically, some accompanying malformation of cartilage or muscle.

I am indebted to Mr. Leonard H. Wilder for the accompanying drawings.

BIBLIOGRAPHY.

1. Roth: Der Kehldeckel und die Stimmritze im Embryo Mitteil. aus d. embr. Institut zu Wein, 1878.
2. Koeliker: Entwickelungsgeschichte des Menschen, 1879.
3. Putelli: Uber einige verklebungen im Gebiete des Kehlkopfes des Embryos. Med. Jahrb., Wien, 1888.
4. Kallius: Beitrage zur Entwickelungsgesch. des Kehlkopfes. Anat. Hefte. Bd. IX., 1897.
5. Fein: Die Verklebungen im Bereiche des embryonalen Kehlkopfes. Archiv f. Laryngol. u. Rhinol. Bd. XV., 1903.

XXXI.

AN OPERATION FOR THE CORRECTION OF EXTERNAL DEFORMITIES OF THE BRIDGE OF THE NOSE.*

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The bridge of the nose is composed of a bony arch, supported, or partly so, by a column. The crura of the arch are formed by the nasal bones and the nasal processes of the superior maxillæ; the latter are important factors in the formation of the arch, and in many skulls form at least half of the crura. The nasal bones articulate with each other, with the perpendicular plate of the ethmoid on which they rest by means of the vertical spine, with the frontal bone and with the superior maxillary bones. The "grain" of the bone of the nasal processes of the superior maxillæ runs upward and outward, or nearly straight upward. This fact is of considerable surgical importance, as it explains in part why fractures of the bridge of the nose rarely extend to the line of the face. It is useful surgically because it permits the bone to split in a straight line, or nearly so, when subjected to the proper measures, the resulting fragments being of use in the rebuilding of the crura of the arch, or permitting a splitting off of the crura from the maxillæ and allowing their replacement in a desired position.

The supporting column of the arch of the nose, the nasal septum, consists of the perpendicular plate of the ethmoid above, the vomer below and the triangular cartilage anteriorly The perpendicular plate of the ethmoid at its articulation with the nasal bones is frequently, almost always, involved in deformities of the nasal bridge; and it is important to remember the anatomic relation it bears to the cribiform plate of the ethmoid. A study of the perpendicular plate of the ethmoid bone in the dried skull shows it possessed of no grain, being a plate of compact bone, liable to split in almost any direction, were sufficient force applied without due caution. The anterior border of this plate, as well as its posterior superior border, where it goes to form the *Crista Galli*, is much thicker than in its central portions, where it is quite thin. The distance from its anterior end, just beneath the anterior ends of the nasal bones backward and upward to the perforated plate, varies in different skulls, but in twenty-five adult skulls examined it ranged from one to one and one-quarter inches.

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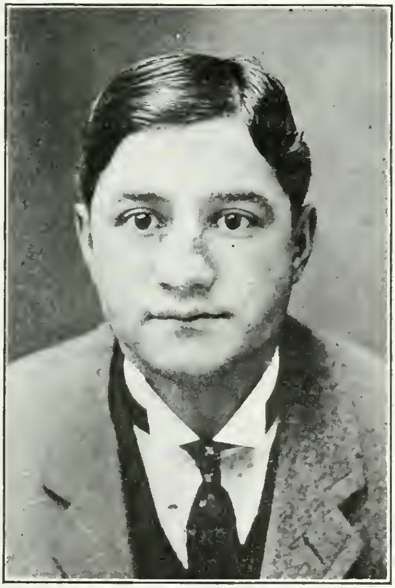

FIGURE A.

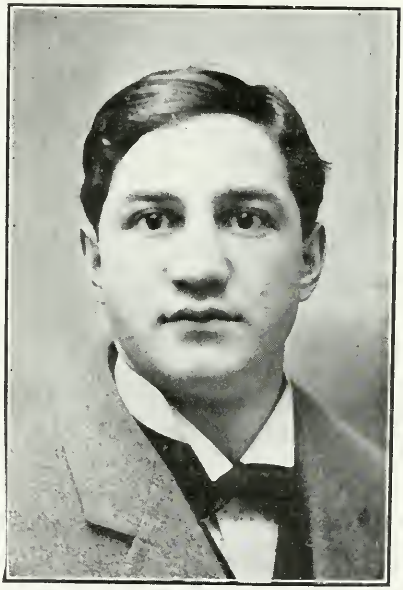

FIGURE B.

This distance may be divided nearly equally by a perpendicular line drawn through the naso-frontal angle. The importance of these measurements is considerable, and should be borne in mind when operating in this locality, for force applied laterally at a depth in the nose beyond the naso-frontal angle, while perhaps not causing fracture into the perforated plate, might readily enough cause a dangerous inflammatory action in the branches of olfactory nerves and their accompanying vessels. With this point borne in mind for the purpose of this paper the nasal septum may be spoken of as a cartilaginous and bony wall, of use in its anterior portions in certain conditions to support and give strength to its superimposed structures.

External deformities of the nose of traumatic or congenital origin may be divided into three classes: those dependent on distortions of the cartilaginous portion, those of the bony portion, and the many combinations of these two conditions. This paper does not deal with the first class. The last two classes may be further divided into concave deformities, saddle noses, deflections of the whole nose, angular deformities and convex deformities or humps. These broad classes frequently are modified by the presence of more than one deformity. For instance, one nasal bone may have been fractured and depressed, while its fellow may have been bent outward, or both nasal bones may have been dislocated from their articulation, depressed and pushed to one side; in either case the result is a deflected bridge, flattened and broadened; if, in addition, the cartilaginous part of the nose has remained in the median line or been pushed to the opposite side, there results also an angular deformity, the combination being very unsightly. Varying from this complex condition to the simple dislocation of the whole nose from its root obliquely outward to its tip are many variations and combinations of displacements.

The first class, that of depressed bridge, usually takes one of two forms, viz.: depression from a separation of the nasal bones where each bone has been turned outward, or depression from a crushing or overlapping of these bones. In both cases the perpendicular plate of the ethmoid has been either bent, or fractured, or both, in at least part of its extent, and in many cases the nasal processes of the superior maxillæ have also been involved. Necessarily there are many combinations of these two classes, and the result is a great variety of deformities. The most common variety, however, in the writer's experience, is caused by an unequal crushing and spreading of the nasal bones with involvement at least on one side of the nasal process of the superior maxilla.

The second class, that of deflection of the bridge, may also be divided into two classes: that from a displacement laterally of the whole bony framework, or that from an unequal displacement without crushing of the crura of the arch, resulting in a displacement of one crus outward and its fellow inward, giving a particularly well-marked angular deformity with a hump on one side of the bridge. In all of these cases there is more or less participation of the cartilaginous portions of the nose, especially of the septum, in the deformity. Deformity of the bridge of the cartilaginous portion of the nose generally is given its character by the direction taken by the upper anterior edge of the triangular cartilage, for when this edge is depressed or deflected the soft parts follow closely the depression or deflection.

Procedures for the correction of fractures of the nose have been in use from the earliest times. Hippocrates (Wright: "The Nose and Throat in Medical History") gave instructions of great value for the correction or setting of recent fractures of the nose. In recent times much has been written on the same subject and on the subject of deformities resulting from neglected traumatism to the nose, but so far as the writer is aware, Roe (*New York Medical Record*, July 18, 1891) was the first to publish operations for the correction of external nasal deformities by subcutaneous methods without the insertion of mechanical devices. In an article by Weir, (*New York Medical Journal*, October 22, 1892), mention is made of the use of a chisel in the inside of the nose to loosen the nasal bones

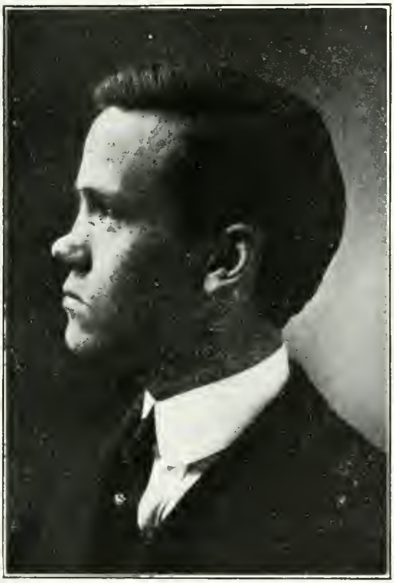

FIGURE C.

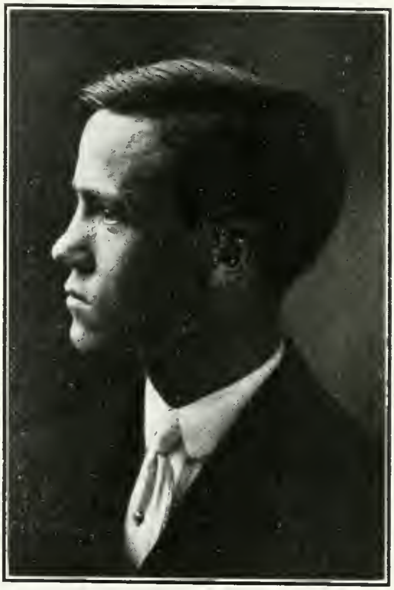

FIGURE D.

from their attachments, but preference is given by him to a method requiring preliminary incision through the integument; while Roe, in the article referred to, gives preference to the internal route, and in a later article, "The Correction of Nasal Deformities by Subcutaneous Operations" (The American Medical Quarterly, June, 1899), described subcutaneous operations for many deformities, both of the hard and soft parts of the nose. The results obtained by Roe are almost ideal, and give his operations pre-eminence over the older operations by the external route.

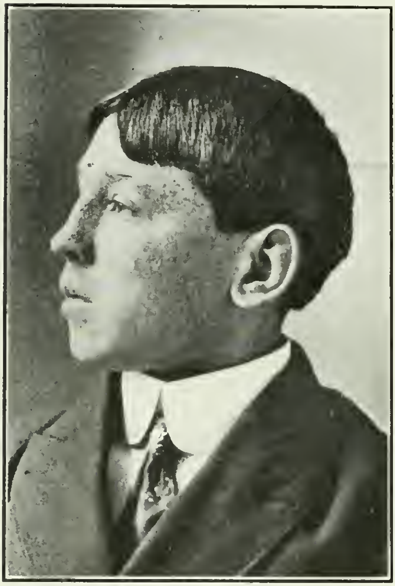

FIGURE E.

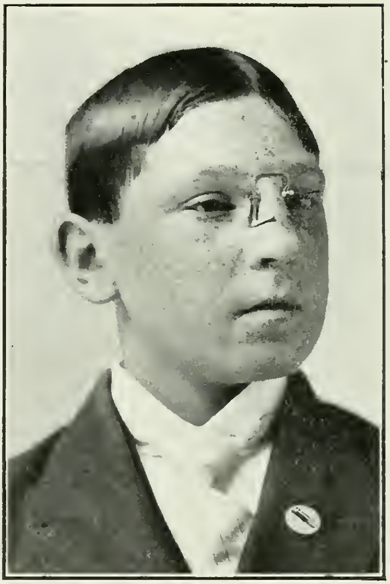

FIGURE F.

Paraffin injected beneath the skin is a valuable procedure in a great number of deformities, especially in those cases where there is loss of tissue from disease, as, for instance, in the saddle-nose of syphilis. It is useful also in aiding the surgeon to fill up or round out the contour of the nose in certain deformities of traumatic origin. It certainly is a valuable method for filling up deficiencies remaining after the correction of the bony deformities, and in many instances seems to the writer preferable to the somewhat difficult task of transplanting tissue by Roe's subcutaneous methods. It is inapplicable, however, in many of those cases of nasal deformity depending in large measure for their unsightliness on various displacements of all or part of the component parts of the nose; for instance, lateral displacements, curvatures of the nose or angular lateral deformities.

In the *Laryngoscope* (March, 1899) the writer under the title "The Rebuilding of a Nose Without the Use of an Artificial Bridge," described a successful operation performed without incision for the elevation of an old depressed fracture of the nasal bones. The brilliant results obtained by Roe, together with the encouragement derived from the success in the case of the writer, and the subsequent success obtained in a series of similar cases, may be accepted as a sufficient excuse for the description in detail of the technique of an operation not perhaps new, but embodying some points at least not made clear in the literature of the subject. It is believed that the operation differs in some details from that described by Roe, although being on the same general plan.

The operation is performed as follows: The vibrissæ are cut from the vestibule and the skin cleansed. The interior of the nose is sprayed with adrenalin chlorid solution 1-1,000, followed by a spray or douche of a mildly antiseptic solution, such as boric acid. The patient is then anesthetized with ether, a mouth gag inserted, and the posterior nares tamponed. The ether is then administered on loose gauze held over the patient's open mouth. Any adhesions or synechiæ between the septum and lateral structures of the nose are divided with a scalpel. One blade of a slightly modified Adams forceps (see cut)—having the blades smoothly polished and the edges of the blades rounded—is placed well up inside the nostril to the articulation of the nasal bone with the septum, the other blade placed outside the nose, protecting the skin with several layers of gauze or with a pad of rubber; the blades are brought in gentle approximation and the forceps are then rotated outward. This procedure breaks the nasal bone from its attachments and lays it outward on the cheek. The forceps should reach almost to the naso-frontal articulation, and it is necessary to hold the inner blade firmly in the anterior superior angle of the cavity of the nose, as at times much force is required to make this fracture complete, and the instrument is apt to slip. The opposite bone is treated in the same manner. After completely fracturing the nasal bones from their attachments, perpendicular plate of the ethmoid taking part in the deformity is corrected by fracture with the same forceps, by rotation or with the Roe (*loc. cit.*) fenestrated forceps. If the Adams forceps are used care should be taken to insert them only to a depth corresponding to the line of the external nasofrontal angle. This will largely tend to prevent fracturing the posterior parts of the perpendicular plate of the ethmoid bone. If the caortilaginous septum is involved, it should be corrected at this time. After the septum is straightened, each nasal bone, with the soft parts protected as before, is grasped with the forceps and turned toward the opposite side of the face. This procedure is important, especially in young patients, as it prevents incomplete fractures and renders the parts malleable. The forceps are again introduced straddling the septum, and the whole bridge is elevated into position by raising the blades; with the blades of the forceps holding up the bridge, the exterior of the nose is moulded by the fingers into the desired shape. If lumps are present, they should be depressed by further fracture with the forceps, or by the following procedure: a small bar of steel—the handle of a mastoid chisel suffices—previously guarded by drawing over it a piece of heavy rubber tubing, is placed against the hump and struck a blow with a mallet. At times this requires considerable force, and care should be exercised not to strike in a direction that might drive a fragment into the surrounding soft parts, or through the nasal mucous membrane. Where the nasal process of the superior maxilla takes part in the deformity, or where this process may be utilized to lengthen one of the crura of the arch of the bridge, it is split off as follows: a square-faced mastoid chisel, or preferably a chisel with a concave cutting edge (see cut), is placed within the nostril just beyond the vestibule against the protruding process. The chisel should be directed upward by holding the handle against the lips, while the cutting edge is held at the junction of the nasal process with the body of the maxilla. A few blows with a mallet will split off the process, or a fragment of it, and the splitting may be repeated through the one incision until the desired amount of bone is completely loosened. These fragments are then moulded with the rest. This splitting off of the nasal processes is particularly valuable in deflections of the whole nose, as it permits of a replacement from the very root of the nose. If the fracturing process has been complete it is surprisingly easy to reform the bony parts of the nose into a desirable shape.

There is practically no muscle strain to undo the moulding, so that until cicatricial contraction begins there is no need for the use of external appliances to act as splints. If the septum has been extensively involved it is well to insert an intranasal splint, one that will support the weight of the soft parts of the nose. For this purpose the writer uses a splint of gutta percha, shaped after the model of his "Cork Splints for Deflections of the Nasal Septum" (*Manhattan Eye and Ear Hospital Report,* 1894). They are fashioned to meet the varying conditions of individual cases, the general shape being depicted in the cut. The long, narrow anterior end is meant to be placed in the sulcus of the vestibule of the nose, which effectually prevents its slipping out of the nostril, at the same time supporting the tip of the nose.

If the septum has not been extensively involved, and if the fracturing has been sufficiently complete, the parts when moulded into position will remain without support either internal or external, at least until cicatricial contraction begins, and this is not until the considerable swelling that always follows any fracture has subsided. The after-treatment for the first three to four days consists in the external application of iced cloths, together with a frequent spraying of the nares with adrenalin chloride solution of sufficient strength only to keep free the nasal drainage and respiration. As the swelling subsides, the nose is manipulated only sufficiently to keep the parts in proper position. If there is a tendency for any part to become depressed it should be replaced and a small packing of gauze or "spunk" *fungus chirurgor* inserted beneath it inside the nostril. Cocain locally applied renders this procedure painless. The manipulation of the bones themselves, when once broken, is lacking in pain until union has taken place. This packing need not be of sufficient bulk to interfere with respiration and should be placed well up beneath the depressed fragment. If the fragment shows a tendency to spread apart externally—and in the writer's experience this is the more frequent occurrence, especially where the nasal processes of the superior maxillæ have been involved—an external splint is applied. This splint is the ordinary so-called "Fox Eye-Glass Clip," with the shell sheathing made somewhat longer and broader than usual. By bending the spring it can be made to hold firmly, and by bending the flanges pressure can be applied at any particular point, and if necessary an extra strip of metal can be fastened to the flanges, as in the photograph. These clips may be worn constantly by the patient, even in bed, with but little discomfort. For street wear glasses may be attached. The patient should be kept under observation for from four to six weeks, and the splints, external or internal, when needed at all should be carried fully this length of time, at least for safety as a protection against cicatricial contraction. If internal splinting is necessary, one splint usually suffices. The splint mentioned may be cleansed *in situ* so readily that it need not be frequently removed.

There are various lesser deformities of the nasal bridge that can be corrected without restoring to the extensive operation detailed. For instance, a small hump caused by the outward displacement of the inferior end of a nasal bone can be reduced by a stroke or two of a mallet, protecting the skin with the rubber-armed chisel handle. When once fractured, the fragment will remain in place without further care. This deformity uncomplicated is rare, and is mentioned only as an instance of what may be accomplished by force when properly applied.

Although the operation is intended for corrections of释 externel deformities of the bridge of the nose, these deformities are frequently complicated by deformities of the cartilaginous portions of the nose—perhaps the most frequent complication being a deflected cartilaginous septum. In fact, the cartilaginous septum practically always takes part in the deflections of the perpendicular plate of the ethmoid. When this complication exists it must be corrected, the writer preferring the fracture method of Adams (*British Medical Journal*, October 2, 1875) or Roe, as these methods do not remove tissues that may be useful in lengthening out the supporting column. This does not alter the after-treatment other than to compel the insertion of an intra-nasal splint, and possibly to necessitate the removal after healing is complete of a septal spur or shelf. If after the nose is healed there remains a depression at any point, and this not infrequently happens, especially just below or at the junction of the cartilaginous with the bony parts, the insertion of a few drops of paraffin with a syringe may be resorted to. Where this proceedure is necessary, preference is given to the method reported by Harmon Smith (*Journal American Medical Association*, September 19, 1903), whereby the paraffin is injected in a semi-solid mass to prevent possible carriage by a blood vessel of a small mass of the paraffin in the form of an embolus or thrombus.

The correction of small convex deformities of the bridge, resulting from the "tilting" of a nasal bone, have been mentioned. Where there is a slight degree of tilting forward and the septum is not involved, the crushing process suffices. Where the crushing process is inadvisable owing to the extent of the convexity the sub-cutaneous dissection after the method of Roe (*loc. cit.*) is resorted to. This is accomplished as follows: The patient is prepared for operation, etherized and tamponed as described. A small quantity of 1-2,000 sterile adrenlin solution is then injected hypodermically into the soft parts about the site to be operated on. This will materially lessen the bleeding. A small scalpel is then used to incise through the soft parts inside the naris just above the vestibule. This is facilitated by using a bivalve speculum to put the ala on the stretch. The scalpel should hug the bone from the junction of the nasal process of the superior maxilla with the body of that bone and extend upward to beyond the articulation of the septum and nasal bones. This proceedure is followed on the opposite side. The two incisions meeting are extended by the use of a small periosteal elevator high up beyond the deformity. Care should be exercised not to perforate the skin, but the incisions should be made as free as possible. The small finger can be inserted a considerable distance between the bone and integument, and be used as a guide for chisel, knife or saw to remove sufficient tissue to give the desired shape. If the nares are small, a bivalve speculum or a small periosteal elevator or other flat, small instrument may be used as a retractor and to protect the integument from injury. Considerable judgment must be exercised as to the amount of tissue to be removed, and care must be taken not to perforate through the parts into the nasal fossæ. The clever manipulation of transplanting a hump from its attachment into another location to fill in a depression has been untried by the writer; preference having been given to the use of paraffin after healing had taken place from the operation for the removal of the hump.

The intra-nasal splint mentioned previously for supporting the septum is made to fit each case in the following manner: A piece of sheet gutta percha is cut into a rectangle one and one-half inches long and twice as broad as the measured distance between the floor of the vestibule and the deepest part of the sulcus of the vestibule. This is dipped into hot water and bent on itself; a small steel instrument is used to preserve a lumen, while the edges are pressed together with the fingers. The splint is then trimmed with scissors or knife into the desired shape and the edges smoothed and "annealed" by bringing them into contact with a hot metal, such as the lid of a steam sterilizer. The edge of the anterior end is flattened somewhat by pressure to avoid irritating the mucous membrane of the sulcus. This splint puts the soft parts of the anterior parts of the nose on the stretch and supports them; at the same time, being quite broad and nearly flat, it lies closely against the septum. Being locked between the floor of the nose, the inferior turbinate and the sulcus of the vestibule, it cannot slip out. It is easily cleaned, is not irritating, and is easily and quickly made.

Photographs A and B are of a patient 20 years of age, whose nose had been injured when he was about 8 years old. There was a sigmoid lateral deflection of the nasal bridge, caused by a dislocation of the right nasal bone and nasal process of the superior maxilla outward. The left nasal bone was at its anterior inferior border dislocated to the left, making a hump, while the tip of the nose was deflected to the right. The whole anterior portion of the septum was deflected in a long bend to the left and was adherent in its upper half to the lateral wall of the nose just above the vestibule. After dividing the adhesions, the chisel was used to free the right nasal process, while the remainder of the operation was completed with the forceps. The intra-nasal splint was carried three weeks and the eye-glass splint was worn six weeks.

Photographs C and D illustrate a patient 22 years old, who had his nose injured in infancy. There evidently had been a simple depressed fracture of the nasal bones involving the nasal processes of both maxillæ. The septum was bent to the right in a long bend terminating near the floor of the nose in a small shelf. There evidently had been some absorption of tissue at the point of articulation of the cartilaginous with the bony bridge. The chisel and forceps were used in this case after the small shelf had been removed from the septum by sawing. An intra-nasal splint alone was used in the after-treatment. It was carried for five weeks. The result of the operation was perfect, excepting that a small depression in the bridge remained just below the nasal bones. This was filled in with paraffin four weeks after healing had taken place *i. e.,* ten weeks after the operation.

Photographs E and F are of a patient 16 years old, with a vague history of possible injury in infancy. The bridge and tip of the nose were deflected to the left of the median line of the face. The right nasal process of the superior maxilla was dislocated to the right. The right nasal bone was lying at an obtuse angle with this process, while the left nasal bone was raised at its whole anterior border, and with the left nasal process made nearly a right angle with the general outline of the face. The appearance of the nose was as though force had been applied to the crest of the bridge, and this crest pushed to the left. The septum nearly occluded the left nostril by a long curved deflection, in which the perpendicular plate of the ethmoid took part. The chisel and forceps were used in this case, and it was extremely interesting to see the play of the septum beneath the skin during its fracture after the nasal bones had been fractured. As the forceps with the septum between the blades were rotated to one side or the other, the whole character of the deformity of the ridge of the crest would change. Extreme rotation to one side would be accompanied by a depression of the bridge and a deflection of the tip to the opposite side. This is mentioned to emphasize the importance of the septum as part of the support of the bridge. The intranasal and the extra-nasal splints were worn in this case for six weeks. The deflection of the septum recurred on the opposite side to a slight degree. The external deformity was successfully corrected excepting at a point just above the tip, where there was an old cicatrix. About one drop of paraffin injected at this point was sufficient to completely obliterate all traces of his old deformity.

XXXII.

MODERN SURGERY OF THE LARYNX, PHARYNX ESOPHAGUS AND TRACHEA.*

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The history of resection and extirpation of vital organs gives us weighty evidence of the fact that operative surgery, the surgery of blood and iron, is the route "per aspera ad astra." In this problem of surgical evolution are linked the names of many investigators; noteworthy advances are coupled with many retrograde steps. The history of science is, on the whole as well as in part, the chronology of human inspiration. Many errors and doubts had to be corrected and dispelled and their places taken by new truths. And this is a process that can only occur gradually. We, as mortals, see only what the end result actually is; God alone knows what results were hoped for. The ideal operative treatment is unfortunately seldom attained.

The following discussion deals with the extirpation of two vitally important organs, viz.: the pharynx and larynx when they are the seat of malignant growths. In addition, the various operative attempts on the air passages, and the deglutition apparatus in general, will be taken up.

An analysis of the history of these operations discloses a chronology which has already been tabulated by Sendziak as follows:

1. Up to 1870—a period of therapeutic nihilism.

2. 1870 to 1873 begins with Billroth's first laryngectomy, the first dawn of rational therapy, a sort of enthusiastic inspiration.

3. 1881 to 1887-88—a period of diversity of opinion. This is an era of searching critique, and extends up to the time of Kaiser Friedrich's illness.

4. From this last mentioned highly dramatic incident up to the present, the time has been occupied with a diligent investigation of the clinical and technical facts connected with malignant disease of the organs under discussion.

The Kaiser Friedrich incident aroused both laiety and profession, and the successful result of the work done demonstrates that the Kaiser's martyrdom was really a blessing in disguise.

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*Monatschrift für Ohrenheilkunde, etc., 1904, Nos. 3 and 4.

We will first discuss the surgical treatment of stenosis of the air passages. König, senior and junior, Küster, Enderlen, Schimmelbusch, v. Mangold, Gallati and v. Hacker have made particularly valuable contributions to this chapter of surgery.

Many cases of stenosis of the trachea are due to extratracheal pressure, yet, as is the case with the larynx, a large number of cases are due to intratracheal cicatrices, due to various causes, and resulting in varying degrees of narrowing of the tracheal lumen.

When we have done all we can with bronchoscopy, intubation, and the various intratrachael procedures, then we must resort to tracheatomy performed below the seat of stricture, when possible. Since my article of 1881 on prophylactic resection of the trachea I have, with others, contended that it is possible to resect large sections of the trachea, and suture the remaining free ends together, or at least to approximate them. The following case illustrates the fact that a cicatricial canal can, under certain conditions, serve as a trachea.

I performed a laryngectomy, and sewed the tracheal stump into the wound. This stump became necrotic, the necrosis extending so far down into the mediastinum that after the tracheal rings has been cast off I could only reach the lumen by inserting one of my "lobster-tailed" canulæ 10 c. m. from the skin opening. Around this canula dense fibrous tissue formed, making a canal 10 c. m. long, which served as a trachea. The configuration of the external scar was exactly the same as it is in the cases of laryngectomy that run a typical course.

Bruns, Küster and others have resected the trachea for various pathologic causes, and have attained permanent results. The lower tracheal segment is sufficiently mobile to make operations in this region relatively easy and safe proceedures. In quite a large number of cases of tracheal stenosis in children, due to intubation, I have performed secondary tracheotomy, and then treated the stenosing diaphragm as follows:

First I performed a tracheotomy as low in the jugulum as possible, between the thyroid isthmus and the arteria anonyma. Then I excised the tracheal fistula, doing at the same time a transverse resection of the trachea, in the region of the scar tissue formation, laying bare the anterior wall of the esophagus. As many tracheal rings are resected (even the cricoid cartilage, if necessary) as is necessary to secure two wide and easily adaptable lumina. After the resection, a circular suture is applied, posteriorly from within outward, and anteriorly from without inward. All reflex phenomena and tracheal symptoms disappear rapidly. The patient, who before the operation was aphonic, now speaks loudly and clearly, in case one has not had to resect too much of the cricoid. The external wound is often completely sutured over the tracheal anastomosis; sometimes a small iodoform drain is inserted. In from three months to a year after the operation, varying with the age of the patient, the tracheotomy tube may be removed permanently. In the meantime the patients wear a tube fitted with a cork or valve, so as to allow phonation. If so much trachea has been resected that it is impossible to unite the two ends it may be possible to bridge over the defect with skin-flaps.

This is done as follows: A rectangular skin-flap is taken from the right side of the neck and used to cover the posterior part of the defect, its two edges being sutured to the tracheal stumps. After it has healed in situ, another rectangular flap is taken from the left side of the neck, and turned over so that the epidermis side covers in the anterior surface of the defect. Thus the space between the two tracheal stumps is converted into a tube. On this last flap is engrafted a skin-periosteum flap, so as to give a firm consistence to the newly made tube.

Of course a cannla must be worn in the lower part of the trachea during the time that all these plastic proceedures are being carried out. The skin which was transplanted gradually takes on a lubricated, mucous character, without any anatomically demonstrable metaplasia of its cells. It adapts itself completely to the new function that it has to take on.

If the new formed trachea is not firm enough to withstand external force, despite the skin-periosteum flap, then we must make a permanent tracheal fistula, to serve as a sort of safety valve against attacks of dyspnea. This lip-shaped fistula can be conveniently closed by the finger or by a pad worn around the neck, when it is desired to phonate. In speaking of laryngectomy, I shall mention a case that was cured by this method.

Tracheal fistulæ may occur as a result of loss of substance due to exfoliative cartilage necrosis. Patients learn instinctively to close these fistulæ temporarily by bending their head whenever they wish to phonate.

There are cases where in the absence of a tracheal fistula we get symptoms of tracheal stenosis due to tracheal scars, or to absorption of the tracheal cartilage, as is seen with struma.

In these cases the symptoms are referable to the fact that the membranous wall of the trachea is sucked into the lumen during inspiration. Such a state of affairs, aside from the possibility of causing immediate death by asphyxia, may cause myocarditis and cardiac dilatation. I remedy this condition by following the method of Schimmelbusch, Koenig and others, viz.: making a pedunculated periosteum-bone soft-parts flap from the sternum, excising the membranous part of the tracheal wall and covering in the defect with this flap. The flap is so turned that the epidermis side is in the lumen of the trachea. After 8 to 10 days the bridge of the flap is cut and the root of the flap turned back into place on the sternum.

When the thyroid cartilage is destroyed and a resulting laryngeal stenosis occurs, the remedy consists in splitting the thyroid cartilage and transplanting a piece of bone in the defect, preferably a bone-flap from the hyoid. v. Mangold advises the transplanting of a piece of rib cartilage under the skin of the chin, and then, after it has healed in from 5 to 7 months, to make a skin-flap containing this piece of cartilage, and transplant it into the defect in the thyroid cartilage. The piece of cartilage should be conical, so that it will tend to separate the two halves of the thyroid.

In broncho-plastics, the inverted cartilage edges are freshened, and then a bone-flap from the manubrium sterni is turned into the defect.

We are therefore in a position to-day to prognosticate perfect cures in obliterating stenosis of the trachea, situated anywhere from the cricothyroid ligament to the jugulum. These cures we institute by incision, excision, vertical or transverse suture, simple or pedunculated flap operations, using bone or periosteum or cartilage when necessary. The Belgian Laryngological Society reports (June 6, 1903) that these methods have been most successfully carried out by Professor Moure and others.

Von Hacker's attempt to use parts of the trachea itself to fill in tracheal defects is too apt to be followed by necrosis. This same objection applies to Foederl's attempt to suture the trachea to the hyoid bone after laryngectomy.

In 1897 my assistant, Dr. Oppenheimer, of Stuttgart, wrote an extensive work on "Inflammatory processes and deep suppuration of the neck." He quotes cases where retropharyngeal pus burrowed down into the anterior and posterior mediastinum. The anterior mediastinum is much more easily approached surgically than is the posterior, because the pus, especially in children, tends to gravitate out through the intercostal spaces, or, as happened in one of our cases, out through the sternum. Moreover, operations on the anterior mediastinum are being performed with good results and in increasing frequency.

The treatment of posterior mediastinitis is not mentioned in text-books on surgery. The fact that such very vital organs lie in the posterior mediastinum, and lie there so deeply buried, is enough to frighten even the keenest operator. I made some experiments in this connection (1892), even before Quenu, Hartmann and Bryant made theirs; I also attempted to incise the bronchi through the posterior mediastinum. Anselm Schwarz in 1893 wrote a work on the anatomy of the extrapulmonary bronchi. He understands "extrapulmonary bronchi" to mean that primitive part of the bronchus above the first collateral branches that are given off, and which, with the corresponding venous and arterial vessels, forms the root of the lung. The collateral branches, with their vessels, form the primitive lung. Only the main bronchus, above the collateral branches, is the essentially surgical portion of the extrapulmonary bronchi, and this part of the bronchial tree can be successfully laid bare and incised only from the posterior mediastinum.

A resection of the fifth, sixth, seventh and eighth ribs (trap-door-flap, or V-shaped flap, with base externally) easily allows the lung to be retracted, either to the right or to the left; and thus permits of exposure of the bronchus, which may then be incised. The bronchus lies about 7 c. m. removed from the chest wall. This bronchotomia postica is a thoroughly justifiable operation. One can open the bronchus from 1 to 2 c. m. from the bifurcation.

The transpleural route can only exceptionally be recommended. The pleura is opened and the finger inserted into the pleural cavity. The lung collapses, and one can feel the bronchus distinctly. In the extrapleural method the pleura is merely pushed aside, a proceedure that can often be easily accomplished without inducing pneumothorax by tearing the pleura.

In a paper on "The Development of Lung Surgery," which I read before the Congress for Internal Medicine (1900), I reported the case of a boy seen by me May 28, 1898, after he had aspirated into his lung a needle, wrapped around with woolen thread. The child suffered from severe pain, attacks of reflex coughing, and a temperature of 105.8 F. A Röntgen picture showed the needle lodged in the left bronchus, lying horizontally across the seventh cervical vertebra. The left chest posteriorly was dull on percussion. The child suffered from anorexia, was markedly emaciated, and had chills with high fever (104). Under these circumstances, on June 18, I resected the third, fourth and fifth ribs, back as far as the costo-vertebral articulation. In the posterior mediastinum I incised the pleura, which was covered with dirty pus, evacuated a lung abscess, and then drained the cavity. Owing to preformed adhesions, a pneumothorax did not result. I could not feel the needle. On the following day, during a severe paroxysm of coughing, the needle was coughed up. I discharged the patient, August 28, healthy and strong.

During that same discussion I called attention to several of my cases, in which I had resected the lung, and which, as long as the smallest fistula remained, could inspire and expire freely if they closed their nose and mouth.

In cases of tumors or of other pathological processes compromising the mediastinal portion of the trachea, I have found the use of especially long tracheal canulæ indispensible, and I always have them ready in my clinic. If we cannot use these canulæ, then death by asphyxia is unavoidable. The patients usually die very shortly after a tracheotomy, from hemorrhage, or from sepsis. My experience, and my experiments with lung resection, teach me that these patients can breathe very nicely through the wound in their lung, and later through the pulmonary fistula. After pneumotomy and pneumo-costopexy we can clamp off the trachea of an animal and see that retrograde breathing through the surface of the lung soon sets in. The wound surface of the lung, which permits respiration, may be surprisingly small. This calls to mind the fact stated by Dubois-Reymond in his lectures. If a duck's thigh is amputated, and then the trachea clamped off, the fowl can still breathe. For the air spaces of the femur are in connection with the lung. The air gets to the lung anti-peristaltically, so to speak, through the canals of the femur.

Only recently, in a case of the most terrible tracheal compression symptoms, I advised making a lung fistula, because all the other known mechanical aids were of no avail. Professors Fränkel and Senator supported me in my opinion. All authors agree that lung wounds are astonishingly tolerant. For a long while they look like freshly cut lung, in a state of fibrous degeneration, with a protecting layer of granulation tissue, and they withstand various external influences. A permanently formed, well functionating lung fistula does not offer the dangers of a post-tracheotomy tracheal fistula. The attempts to avoid pneummothorax in mediastinal and pulmonary operations or at least to render these conditions less dangerous, will tend to strengthen the idea that the creation of a pulmonary fistula is a life-saving operation. Besides the experiments of Willard-Delorme and Duplay, concerning costo-pneumopexy and pulmonary decortication, we must mention the work of Karewsky, who by the aid of silk sutures soaked, in turpentine, secured pleural adhesions. He passed these sutures, extrapleurally, through the intercostal muscles, with and without rib-resection. We must also mention the experiments performed in von Mikulicz's clinic, to rob pneumothorax of its dangers.

I shall repeat my thesis: In cases of tracheal or bronchial stenosis, where we cannot make use of mechanical aid, and where it is a matter of life and death, a pulmonary fistula should be made.

In benign polypoid and papillomatous tumors, the endolaryngeal method of removal has won great triumphs in the hands of laryngologists. According to Moritz Schmidt, B. Fränkel deserves credit as being the first to recommend this method of removing early diagnosed epitheliomata of the vocal cords. The malignant growths may be removed thus with good results. However, in the large majority of cases, especially where there is a circumscribed tumor with malignant tendency, thyrotomy will continue to be the operation of choice, an operation which has yielded such excellent results in the hands of Butlin and Sir Felix Semon.

In the December number of the "Annales des maladies de l'oreille et du larynx," is an article by Sir Felix Semon, on "Thyrotomie et laryngectomie dans le cancer du larynx," and in the January number of the "International Centralbalatt für Laryngologie und Rhinologie" the same author considers the question of doing away with the tamponade in the wound and the canula in the trachea after laryngo-fissure for malignant endolaryngeal growths.

I must admit that since our endolaryngeal technique has improved I feel that concerning the question of thyrotomy:

1. Careful examination enable us, in a large number of

cases, to recognize carcinoma of the vocal cords, even in the earliest stages.

2. Thyrotomy, in these cases, is not a palliative measure, but a conservative, radical one, blessed by good results.

3. Thyrotomy, without tamponade, and without a tracheal canula, practised in cases of circumscribed carcinoma, is followed by perfect healing, in a surprisingly short time.

My technique in cases of diffuse papilloma of the larynx and in circumscribed carcinoma of the vocal cords is as follows:

(*a*) Median incision from hyoid bone, or the thyroid incisure, to the lower border of the cricoid cartilage, after having first done a low tracheotomy.

(*b*) Incision of the fascia and retraction of the muscles, until the larynx is exposed. Careful hemostasis.

(*c*) Split the conoid ligament and the thyroid cartilage exactly in the median line, with a laryngeal scissors, after first having opened the larynx with a small knife in the middle of the thyroid incisure (the larynx being drawn forward by a sharp hook).

(*d*) Application of a cocain-antipyrine solution (cocain-antipyrine aa 5.0, Aqua dist. 100.0. Carbolic acid 1.0), or of a 1 to 1,000 adrenalin solution in 5 per cent. cocain. Extirpation of all the diseased tissue with knife, scissors and cautery, the larynx in the meantime being well illuminated. Water-tight iodoform gauze tamponade of the larynx, suture of the thyroid. The tracheal canula remains in situ; the patient gets out of bed the day of the operation. Deglutition is not interfered with.

(*c*) In from 48 to 72 hours the tampon is removed, and in from 4 to 5 days the canula. After 12 to 20 days healing is complete. A secondary skin suture is unnecessary.

In tuberculosis of the larynx and epiglottis, where an extensive surgical operation is required, I pursue the following technique: Total laryngo-fissure, exenteration of the larynx, with excision of diseased cartilage, extirpation of the epiglottis, as a final step, free use of the cautery, then iodoform tamponade of the wound and the insertion of a canula. The patients can swallow after this operation without the slightest difficulty.

After about eight days, a little of the cartilage is resected from the fissure of the thyroid and cricoid cartilages.

Total laryngoplasty, using pedunculated flaps, or, where possible, bridge flaps, and fixing them to the mucous membrane of the pyriform sinus, and to the lateral and posterior aspects of the trachea by means of accurately applied sutures. One or two sutures also fix the flaps in the depth of the laryngeal cavity. Preferably these flaps are taken from the submental region. If the patient has a beard we must take the flaps from a hairless part of the face. The flaps are also partly secured in place by iodoform packings. After healing occurs, the patient has an artificial laryngoschism which, however, does not interfere with speech, because the two edges of the thyroid cartilage come together. By these plastic operations one can fill out the whole laryngeal cavity with skin grafts, and this skin takes on the character of mucous membrane.

I performed this operation for the first time seven years ago, with excellent result, on a young merchant. He still remains in perfect health. I had removed one of his testicles for caseous tuberculous orchitis and epididymitis. He suffered from pulmonary tuberculosis, with severe dysphagia and dyspnea. In this case I may claim with perfect right that, by means of total laryngoplasty, I formed a new larynx for him. The patient does not wear a canula, but breathes through his laryngo-fissure, seems perfectly well, and attends to business. He speaks in a loud tone of voice, which he can modify, and he can sing the notes of the scale. His cutaneous aditus laryngis is an elliptical slit, about twice the size of a split pea; and thanks to the fact that the expired air causes the free edges of this slit to vibrate, he can speak excellently well and loud. Had the slit been too wide he would at most have been able only to whisper. In other words we here have a case of laryngeal tuberculosis, treated as a local tuberculosis, and as a result, permanent healing was secured.

I shall now describe the technique of a hemilaryngectomy. If a preliminary tracheotomy has not been done, and the patient is not dyspneic, I proceed as follows: Median incision from hyoid bone to lower edge of cricoid. Ligation of hyoid and cricothyroid arteries. Constructing of a rectangular flap by two incisions, at right angles to the ends of vertical incision on the diseased side of the larynx. Flap dissected backward so that inner border of sternomastoid is exposed. Diseased side of larynx dissected bare, under careful hemostasis. Superior laryngeal artery clamped before it enters larynx, the horn of the hyoid bone cut away, and then the artery ligated and divided. Thyroid gland retracted downward, or, if necessary, a part of the struma may be resected. The soft parts are dissected away from the larynx by means of blunt dissection.

Only after all bleeding has been arrested and the half of the larynx has been dissected free as far as the median line posteriorly, do we proceed to the resection. Now we make a tracheotomy opening and insert a Hahn's tampon canula; or we can avoid this by operating with the patient in the "hanging head" position. Total laryngofissure is now done as the final act of the operation. Cocaine-adrenalin solution is applied to the laryngeal mucosa. Now the thyrohyoid membrane and and mucous membrane of the diseased side are split, the ligament and mucous membrane between thyroid and cricoid cartilages also split transversely as far as the median line. Finally the posterior wall of the fully mobilized larynx is divided (being scrupulously careful to avoid wounding the esophagus) and the diseased half is removed. We now place our original skin-flap in position, so that it is applied to the wound edge of the mucous membrane of the sinus pyriformis above, to the trachea below, and in the median line, to the remaining half of the larynx. Any defect in pharynx or esophagus must be first carefully repaired. We may use a second tongue-shaped skin-flap, taken from the hyoid region (base upward), to turn down into the larynx and fix there, so as to close the wound off from all communication above. The larynx space is now carefully packed with iodoform gauze. A thin stomach tube is inserted into the esophagus, through the nose, and remains in situ until the patient is allowed to swallow. Gauze strips are packed around the canula opening to drain the tracheotomy wound. Of course, the operation can be done without any plastic skin-flaps, but I hold them to be of great importance in avoiding aspiration pneumonia. Moreover, after healing has occurred, the skin-flaps serve in large measure to take the place of the removed portion of larynx.

The laryngoschism is in no way disturbing; it can be done away with whenever it is so desired. I always argue against doing away with it, however.

In cases of primary carcinoma of the epiglottis, I start out with a subhyoid pharyngotomy. An incision opposite the lower border of the hyoid bone lays the epiglottis bare. The mucous membrane is divided at the upper edge of the thyroid cartilage and the epiglottis is cut off at the base with a thermocautery.

In one case I extirpated the epiglottis, hyoid bone and base of the tongue together. I shall say more of this later.

I should like to mention one important point, viz.: after extirpation of the epiglottis and base of the tongue, for carcinoma, the patient must wear a tracheal canula. If the operation was extensive there is great danger of aspiration pneumonia. Even tamponade of the wound does not surely guard against it. We believe that in such cases we can surely guard against aspiration pneumonia by (*a*) Careful tamponading of the larynx, through the aditus; (*b*) suturing the tampon in place, so as to fix it securely; (*c*) temporarily closing the aditus of the larynx by a plastic operation. I shall describe my technique for these operations, but I must add that it has been modified a great deal during the last two years, although it gave good results formerly.

In cases where tracheotomy has been performed, or in cases where it has not been necessary, we do not start in with resection of the trachea, but do this at the end of the operation, after the larynx has been dissected free, and mobilized. With the patient in the hanging head position, we divide the larynx from its connections to hyoid bone and then draw larynx and trachea out of the wound. Strong sutures are passed through the trachea and then this organ is divided transversely above the sutures and below the cricoid cartilage. The tracheal stump is then sewed in the wound.

The method which I am going to describe now must be used under certain circumstances:

Case 1. Total extirpation of larynx and epiglottis, resection of pharynx and extirpation of diseased lymph nodes.

1. Incision. Two horizontal incisions, extending from the middle of the right to the posterior border of the left sternomastoid. The upper incision is on a level with hyoid bone, the lower one just below cricoid cartilage. These two incisions are connected by a vertical incision, made along the posterior border of left stermomastoid. The skin-flap is then dissected back.

2. Larynx dissected free. Left sternomastoid divided transversely at level of both transverse incisions. Omohyoid muscle divided where it emerges from under the sternomastoid. Then I try to free the adherent lymph nodes and muscle from the vessels by blunt dissection. This is easily done as regards the carotid artery, but with the jugular vein they are often so densely adherent that the vein has to be resected with the mass. Now the sternohyoid and sternothyroid muscles are cut across on both sides, on a level with the lower border of the cricoid cartilage. Ligature of the thyroid artery. Incision of the tough fascial layer, which lies in front of the trachea, and re-

traction of the thyroid isthmus downward, until the first four tracheal rings come into view. Lateral aspect of these four rings dissected free. Posterior surface of trachea allowed to remain undisturbed. Sternohyoid, omohyoid and thyrohyoid muscle insertions to the hyoid bone divided, and the right and left superior laryngeal artery tied off and divided.

3. Division of the trachea. Cricotracheal ligament divided, and then two guide sutures are passed through the anterior wall of the trachea. By traction on these and on the sharp hook inserted in the lower border of the cricoid, the tracheal wound is made to gap. Now the trachea is divided from the cricoid along its whole circumference and the esophagus is peeled off the trachea for a distance of two centimeters by blunt dissection. The tracheal stump can now easily be drawn to the level of the skin. Its anterior circumference is sutured to the skin with a few matrass sutures. The rectangular skin-flap is now placed in position and the posterior surface of the trachea is sutured to it. Thus the tracheal opening is surrounded on all sides by skin. The anesthetic is now administered through the tracheal canula.

4. Extirpation of the larynx. Crowd in over the hyoid bone, and divide on both sides, the insertions of the mylohyoid and geniohyoid muscles, as well as the median and lateral glosso-epiglottic ligaments. Thus we enter the pharyngeal space, in front of the epiglottis. Mouth is completely tamponed with gauze, through the wound. With bone scissors the hyoid bone is divided on both sides, just median to the insertion of the digastric muscle. Now, if one retracts the hyoid bone upward he obtains a good view, from above, of the posterior surface of the epiglottis, the sinus pyriformis, and the aditus laryngis. One could see the carcinoma, in my case, situated on the left side, and involving the whole sinus pyriformis, base of the epiglottis, and any epiglottis ligament. Thyrohyoid membrane divided from the horns of the hyoid bone on both sides, cutting through the mucous membrane at the same time. Division of the inferior constrictor muscles of the pharynx and the mucous membrane over them. Finally, the anterior wall of the esophagus is divided on a level with the upper border of the thyroid cartilage; then the anterior part of the esophagus is separated from the posterior wall of the pharynx, by blunt dissection.

5. Closure of the wound. The closure of the esophageal and pharyngeal wound is very difficult, owing to the fact that there

was a good deal of tension on the sutures which were used to bring the anterior wall of the esophagus up to the base of the togue. We can always succeed however, in closing the defect in the horizontal direction. A vertical suture in my case was impossible because there was not enough of the posterior pharyngeal wall left. Before suturing the mucosa a small stomach tube was slipped into the esophagus through the nose. The suture line was reinforced by sewing the muscle stumps and fascia over it. The upper lobe of the thyroid was also used to strengthen the suture line. Then the skin-flap was sutured in place all around, that part of it around the tracheal stump having already been sutured in place. Two gauze drains were placed under the flap and brought out at the lower angle. Light compression bandage.

Case No. II. Tumor which is said to have taken its origin from left aryepiglottic fold, and which now extends to left pharyngeal wall, as high up as the tonsil, filling in the sinus pyriformis and extending downward around the esophagus. One can just reach the lower border of the tumor, palpating through the mouth, with the index finger.

1. Operation. Laying the larynx free anteriorly. Median vertical incision, beginning a little above the hyoid bone and running as low down as the jugulum. Skin and fascia divided. The thick layer of fascia which runs from isthmus of thyroid to cricoid cartilage is divided horizontally, and the isthmus is retracted downward, exposing the first few tracheal rings. Ligation of cricothyroid artery.

Transverse incision, through skin and platysma, reaching to the inner border of both sternomastoids. Anterior jugular vein ligated. Sternohyoid, thyrohyoid and omohyoid muscles divided just below the hyoid bone. The sternothyroid is divided at its insertion in the thyroid cartilage. The muscle stumps remain in connection with the skin-flaps, on both sides, which are retracted outward. Both upper poles of the thyroid gland seemed to be involved in the tumor mass. Both superior thyroid arteries ligated and divided. Both upper poles of the thyroid gland were resected, and the bleeding surfaces sutured. The lower half of the thyroid was pushed away from the cricoid cartilage and trachea by blunt dissection. Superior laryngeal artery ligated on both sides, just as it enters the thyrohyoid membrane. Now the entire anterior surface of the larynx was free.

2. Separation of larynx from hyoid bone. Transverse di-

vision of pharynx, with patient in hanging head position. The hyoid bone is drawn forward and upward by means of a sharp hook, and the thyrohyoid membrane is cut close to its hyoid attachment. Then, by small incisions along the upper and posterior surface of the hyoid bone, the pharynx is opened between the base of the tongue and the anterior surface of the epiglottis. The incision is enlarged laterally along lower border of hyoid bone, to where the lateral thyrohyoid ligament is attached. Now one can draw the aditus of the larynx upward, allowing the patient to breathe freely, and yet guarding against the aspiration of blood into the trachea. The thyrohyoid ligament is cut through on both sides; one now works toward the median line, from the internal carotid artery, crowding into the loose connective tissue, from behind the posterior pharyngeal wall forward. With the finger of the other hand work in the same manner until both fingers meet. Now the entire pharynx will be free. The hemorrhage is very slight, and easily checked by packing.

3. Resection of esophagus and trachea. While the larynx is being pulled gently upward and forward the posterior pharyngeal wall and esophagus are loosened from their base, with the finger, until we get as far downward as the first tracheal rings. We have now reached the lower border of the tumor. Now the larynx is drawn sharply forward, so as to pull the trachea up to the level of the skin wound. Now a needle, threaded with a stout suture, is passed through the skin, tracheal wall, and back through the skin 1 c. m. removed from the point of entrance. This same plan is repeated on the other side. Two iodoform strips are now laid between trachea and skin, and the sutures are tied over it. Above the sutures, the trachea and then the esophagus are cut transversely across.

4. Extirpation of the remainder of the tumor from the lateral aspects of the pharyngeal wall. Divide the hyoid bone through its center. Retract the left half forward and outward, and we can now see the upper border of the tumor well (with patient in hanging head position). Circumscribe the tumor well into healthy tissue, and then complete the extirpation by blunt dissection, getting the finger behind the tumor and shelling it out from above. The left half of the hyoid bone is removed with the tumor.

5. Care of the wound. Ordinary canula is put in the trachea, and a soft stomach tube in the esophagus, which is led out of the wound anteriorly. Iodoform gauze is packed all around

the esophagus stump. The anterior part of the esophagus is united to the posterior part of the trachea by a few sutures. The mucous membrane of the base of the tongue and the lateral pharyngeal wall are united to the skin of the upper part of the wound, as far as it is possible to do this. These sutures should be tied over strips of iodoform gauze. A large, rather firm ball of sterile gauze serves to wall off the wound from the mouth and its secretions. The ball is held in place by a few sutures, passed through the wound edges.

In cases where we have removed larynx, epiglottis, root of tongue, and anterior and lateral walls of pharynx, and where we have anchored the tongue stump to the skin of the submental region, we do not perform a plastic operation at the same sitting, but wait, say four to six weeks, until the defect has been closed by provisional cicatrix formation. During the process of healing the defect contracts a great deal, eventually assuming the form of an equilateral triangle, with its apex pointing upward. The floor of this triangle is formed by the posterior pharyngeal wall. The sides of the triangle are cicatrized to the skin, along two lines, corresponding to the inner margins of the sternomastoid muscle. The base of the triangle is formed by the cicatrix between the stump of the tongue and the skin under the chin. The apex of the triangle is formed by the stump of the trachea, behind which lies the opening of the esophagus.

The cuff of skin behind the trachea is now freshened up by careful dissection, that is, by a dissection which freshens the apex of the triangle. A horizontal incision is now made through the skin, extending outward from the end of one of the limbs of the triangle. This incision is 3 to 4 c. m. long. Another one is then made parallel to it, and the two ends of these incisions are joined by means of a vertical incision. A rectanglar skin-flap is thus outlined. This flap is raised and turned over (epidermis side inward) against the posterior pharyngeal wall.

Similar incisions are now made, extending outward, from the two ends of the other side of the defect. The rectangular flap, so outlined, is then dissected back. The cicatrix joining the base of the tongue to the skin is now freshened.

The flap first made is turned in so that its epidermal side faces inward. Above it is sutured to the substance of the tongue, below to the defect in the anterior esophageal wall;

while its free edge is sutured to the edge of opposite side of the wound.

The second flap is then turned in so that its raw surface covers over the reconstructed pharyngeal defect, and it is fixed in place as follows:

1. The lower edge of the flap is sutured to the posterior edge of the tracheal stump.
2. The upper edge is sutured to the upper part of the defect, in the chin region.
3 The lateral edge is sutured to the wound edge of the side opposite to the one from which the flap was taken.

A stomach tube is inserted into the esophagus, through the nose. A tracheal canula is inserted, and a light compression bandage applied.

In doing a complete laryngectomy, a rectangular flap is made, the incisions being situated over the hyoid bone and cricoid cartilage, extending transversely from one sternomastoid muscle to the other. The ends of these two horizontal incisions are connected by a vertical incision, and then the whole flap is turned back. A transverse incision 4 c. m. long is then made in the jugulum, and the bridge of tissue extending from this incision to the previously made flap is dissected free from the underlying tisue. After the larynx has been extirpated the tracheal stump is brought under this flap and sewed into the wound in the jugulum by means of an accurately applied circular suture. In order to sufficiently mobilize the tracheal stump so that it may be drawn into the lower angle of the wound, the fascia must be split in the mid-line of the lower part of the neck. It is entirely unnecessary to fix the posterior tracheal wall to the anterior wall of the esophagus, for it is exactly at this point that fistulæ occur so readily and so frequently, causing very disagreeable symptoms.

I attempt rather to keep the trachea well separated from the pharynx and esophagus by a barrier of tissue, preferably by a well-nourished skin-flap, which covers the pharynx and esophagus, just as the external skin-flap covers the trachea. By this method we secure a safe cicatrization around the trachea, as well as around the pharynx and esophagus. The wound in the pharynx must be accurately sutured, and the skin-flap sutured in place over it. I do not make a preliminary tracheotomy unless it is urgently indicated to do so on account of severe dyspnea.

With the patient in Rose's position, a stout silk suture is placed in the median line, just beneath the hyoid bone, and another one is passed through the thyroid incisure of the thyroid cartilage. These are then held tense, and the laryngeal cavity is opened by a transverse incision, made between the two sutures. The larynx is then drawn anteriorly, and a small canula is sutured into it. Extirpation of the larynx then follows. As soon as the laryngeal cavity has been opened the pharyngeal mucosa is incised along the posterior circumference of the larynx, the knife being held perpendicular to the laryngeal wall. The pharyngeal mucosa is then carefully separated from the posterior laryngeal wall, each bleeding point being caught and tied off.

The trachea is now pierced in the median line and laterally, at the level of the second ring, with strong silk sutures. These are held tense and, the larynx is divided from the trachea, at the level of the cricoid cartilage, unless the disease extends further down than this, in which case the division is made at the lower level.

The edges of the pharyngeal mucous membrane are grasped with artery forceps, and then sutured together over a small stomach tube, that has previously been inserted into the esophagus through the nose. Another row or two of sutures are then passed through the muscular pharyngeal coats. All bleeding vessels are then tied off, and the wound packed with iodoform gaude. The skin-flap is fixed over the pharyngeal defect with two or three matrass sutures, and a light compression bandage is applied.

Thus we see the larynx is laid bare on its anterior and lateral aspects, and the muscles cut off close to their laryngeal attachment. The thyroid gland is retracted from the larynx, downward, and to one side; the superior laryngeal artery is tied off on both sides, just before it enters the larynx. I then place the patient so that his head hangs over the edge of the table, and I divide the ligament between the thyroid cartilege and hyoid bone. I then lead a gauze tampon from the wound, upward into the pharynx, so as to avoid infecting the wound with saliva. The larynx is then drawn forward and freed from its esophageal attachment, until the entire larynx is freed as far down as the cricoid cartilage, so that it can be drawn forward and freed from its esophageal attachment, until the entire larynx is freed as far down as the cricoid cartilage, so that it can be drawn forward into the wound. Then a 5 c. m. horizontal incision is made in the jugulum, and the skin is dissected free from the fascia, up as far as the first incision, thus making a skin bridge flap about 5 c. m. wide. Then I transfix the trachea, just below the cricoid, with two strong silk sutures, divide the trachea just above these sutures, and then, by traction on the sutures, draw the tracheal stump under the bridge flap, into the the wound in the jugulum. The tracheal stump is then sewed permanently to the skin edges of this wound. The pharynx is then carefully sewed, so as to prevent the escape of saliva into the wound, all pockets are packed with iodoform gauze, and the skin is sutured. The patient is fed through a stomach tube, introduced through the nose.

In order to extirpate the pharynx with the larynx, I make a median incision, lay the whole larynx bare, and then put the patient in Rose's position; then I incise the ligaments between the hyoid bone and the larynx and draw the aditus laryngis forward. The interior of the pharynx is now well in view, and I can easily cut away the anterior and lateral parts of the larynx, between clamps and ligatures. Then I free the pharynx and esophagus from the vertebral column far enough to permit a complete excision of the tumor. I then divide the esophagus as far as possible below the tumor, and then free the anterior surface of the esophagus from the trachea. Then the larynx is extirpated, just as I have previously described. I then protect the wound against mouth secretions, by a suture of the pharyngeal wall, or by iodoform tampons, in case the pharynx has been extirpated very high up. The patient is fed as before described. The wound is packed with iodoform gauze and the skin is sutured over it.

The suture of the pharynx is very important. For if one packs the wound with iodoform gauze without closing off the pharynx the patients are tormented by unbearable reflex symptoms, and, as a result, they produce enormous quantities of a ropy mucus. The reflex symptoms, and the mucus production are absent when the pharynx is sutured. If only a partial suture can be made, even then it is possible to arrange the tamponading of the wound so that the gauze causes no reflex symptoms, viz.: by keeping it entirely extrapharyngeal. In some cases the thyroid lobes must be removed with the larynx. In these cases the superior and inferior thyroid arteries must be tied off, or else the lobe resected after applying clamps or ligatures. The ascending pharyngeal artery can be ligated and divided during the pharyngectomy.

It is surprising how safely, bloodless and clean the operation is when done according to these principles. I have, indeed, in some cases, resected the esophagus as low down as the mediastinum, held the esophageal stump in place with artery forceps, carefully packed off the posterior mediastinum, introduced a stomach tube in the esophageal stump, and held it there with sutures. In still other cases, employing the same method, I have had to resect the base of the tongue.

In cases of malignant tumors, where the pharynx and larynx have to be sacrificed, one can do it with the greatest possible safety, through a simple median incision, as I have just described; moreover, the esophagus and the hypopharynx can be resected, as high up as the base of the skull, with no need of resection of the jaw.

When the tumor is located elsewhere, naturally, the present methods of pharyngotomy (subhyoid, median or lateral), or of Kocher's normal incision, must be practised.

In cases requiring an extensive radical operation, I can most warmly recommend this new method of operating. If more radical work has to be done, it is advisable to make a temporary tracheotomy and to close off the larynx space entirely, either by suture, or by tampons. We must also create an organic diaphragm, to separate the wound from all mouth secretions. If carcinomatous lymph nodes must be removed I proceed differently, according to whether they are adherent to the larynx or movable. I remove movable nodes through a separate incision, made along the anterior border of the sternocleidomastoid. Through such an incision one can remove nodes, and a portion of the internal jugular or cartoid, if necessary, without establishing any communication with the laryngectomy wound. Morover, the wound heals per primam. This is important, for if ligated vessels or their stumps lie exposed in a suppurating wound, the patient may have a hemorrhage at any time. If the nodes are adherent to the larynx I remove them with the larynx. If one has to deal with large lymph-node tumors, requiring the extirpation of adherent muscles or vessels, it may be necessary to add to the longitudinal incision, by making incisions transversely. In such cases I try to protect the vessels or their stumps by sewing skin-flaps over them, thus guarding against erosion of the vessels and subsequent hemorrhage.

To sum up then, the extirpation of larynx and pharynx is done as follows:

1. Longitudinal incision from hyoid to cricotracheal ligament.

2. A 4 to 5 c. m. horizontal incision, one finger's breadth above the jugulum, and a tunneling of a bridge flap up to the lower end of the longitudinal incision.

3. Sharp and blunt dissection of the larynx, freeing it from all its attachments, with careful ligature of all bleeding points.

4. Ligation of both superior thyroids before they enter the larynx. Division of both corners of the thyroid cartilage with laryngeal scissors.

5. Thyroid gland carefully dissected back, and, when necessary, the upper pole resected after application of ligatures.

6. When infiltrated nodes are felt under the muscles, laterally to the larynx, the muscles must be sacrificed.

7. The pharynx is treated similarly. First ligate the ascending pharyngeal artery, if it happens to be injured during the operation. Sometimes the superior thyroid must be ligated on one or both sides, in case a portion of the thyroid has to be resected.

8. Temporary packing of the wound. Patient placed in Rose's position. A stout silk suture is passed in median line of thyroid incisure, just under the hyoid bone.

9. Opening of the thyroid, just at the border of the thyroid cartilage. Careful grasping of the mucous membrane with clamps. Cocain-adrenaline application, to check reflexes and bleeding. Inserting of a small canula into larynx, where it is held in place by sutures.

10. Careful resection of the pharynx back to the spinal column; cutting only between clamps or ligatures.

11. Careful suture of the upper pharynx stump.

12. By blunt dissection, the pharynx and esophagus is dissected free from the spinal column, until healthy tissue is reached.

13. Transverse division of the trachea, below the larynx, after the already described tracheal sutures have been passed. Treatment of the tracheal stump as in laryngectomy. In separating the esophagus from the hypopharynx, or in cutting through the esophagus at a lower level in the mediastinum, the esophagus walls are temporarily fixed by means of clamps. Likewise is the stomach tube fixed in place in the esophagus by means of sutures. Now comes a general revision and a final checking of the bleeding with hemostatic sutures, where necessary, packing the wound with iodoform gauze, suture of

the skin, and the application of a light compression bandage.

The patient is instructed not to practise any movements of deglutition, and to expectorate all saliva and mucus. Mouth, tongue and teeth are kept scrupulously clean by being frequently wiped off with a one-half per cent. solution of aluminum acetate.

The patient must sit up or get out of bed the day after the operation, in order to avoid a hypostatic pneumonia.

I never use the Trendenberg or Hahn canula; and by not using them I avoid trauma to the tracheal mucous membrane, and consequent tracheobronchitis. An aspiration pneumonia can be ruled out absolutely, for neither during the operation, nor during the after treatment, does a single drop of blood or wound secretion get into the air passages.

It is very important for the success of the operation that the stomach be absolutely empty. I operate in Rose's position (hanging head), so that if the stomach were not empty the gastric contents would run right out through the esophagus, into the wound, dangerously infecting it.

In cases where only a tracheatomy is possible, or where recurrence renders deglutition impossible, we do not hesitate to proceed according to Helferich's recommendation, and to make a gastrostomy opening.

Concerning the prognosis regarding length of life in laryngeal and pharyngeal carcinoma, I know of patients who were treated for years before the diagnosis of carcinoma was firmly established. In other cases, two to three years have elapsed. Other patients, in addition to their carcinoma, had large papillomatous growths, which were removed by the endolaryngeal route, and which complicated the diagnosis. Langenbeck has called attention to the fact that in malignant growths, for example, of the superior maxilla, the mucous membrane of the antrum of Highmore was often the seat of diffuse papillomata The carcinoma may exist a longer or shorter period before it is diagnosed, causing either severe or trivial subjective symptoms.

Fairly large carcinomata may be situated on the petiolus of the epiglottis, and not cause very severe symptoms. Retrolaryngeal carcinomata may degenerate, become putrid, and be accompanied by lymphatic metastases, without causing severe symptoms. On the other hand, very small tumors may cause intensely severe symptoms by inducing swelling and edema, difficulty of respiration or deglutition, hoarseness and hemorrhage.

The fate of the patient, we must all agree, depends upon early diagnosis and radical operation. We agree absolutely with Sir Felix Semon's dictum: "I am certain that the prospects of cure in an early operated laryngeal carcinoma are as good, if not better then, for carcinoma situated anywhere in the body." I wish this consolatory thought would receive wide-spread recognition. Unfortunately, the microscopic examination of small curettings is often unsatisfactory.

The pathologist demands portions of the deeper part of the tumor before he will make a positive diagnosis, and in order to get these deeper parts a resection of the larynx is necessary. So it is often impossible to secure a positive miscroscopic diagnosis before operation, and neither the physician nor the patient cares to advise operation on a tentative diagnosis.

The laryngoscopic examination is also often deceptive. A carcinoma may be taken to be merely a mild affection of the mucous membrane. These are tragical surprises which happen to the most experienced men, and which give rise to mental reservation, as regards results, in every case of laryngeal carcinoma that is operated upon.

There are cases in which, from the first symptom until death, only one and one-half years elapse. In other cases the diagnosis is made, the patient refuses operation, and in from six months to a year later is in such a condition that tracheotomy is necessary.

After the tracheotomy a year may pass before difficulties in deglutition and necrosis of the tumor gradually usher in death. Thus the duration varies, according to the position, character and rapidity of growth of the tumor, provided no operative interference is instituted. Lymph node involvement in the neck develops comparatively late in endolaryngeal carcinoma. Metastases also develop relatively seldom.

In order to make clear the difficulty of exact diagnosis in laryngeal carcinoma I shall cite two cases, referred to in the thorough work of Prof. B. Fränkel.

In the first case Fränkel diagnosed a pachydermic swelling on the right cord. In the course of three months the swelling had increased in size, from before backward, and in thickness. The microscopic examination showed epithelial strands going deeply into the connective tissue, in places with no well marked border; but there were no epithelial pearls. This find, if it did not definitely speak for carcinoma, was at least very suggestive of it. After an endolaryngeal removal of the growth a recurrence occurred in two months. Another microscopic examination now showed undoubted carcinoma. Laryngofissure was now performed by Prof Hahn, who removed the right vocal cord and the right vocal process. Uncomplicated healing took place, and now, five years later, the patient is entirely well and has a fairly good voice.

In case 2 Fränkel also made a diagnosis of pachydermia diffusa, with nodule formation. Three months later a microscopic examination of the growth, which had progressively increased in size, showed undoubted carcinoma. The diseased cord was removed by laryngofissure, and complete healing occurred, a fact which was confirmed two years later, when an autopsy was performed on the patient. The patient died of a primary adeno-carcinoma of the intestine; in other words, this is one of the cases of an individual suffering from two carcinomata. The autopsy showed the larynx to be free from every suspicion of a carcinoma.

These two cases show that carcinoma can develop from pachydermia of the cords. The cases illustrate the difficulty of diagnosis in endolaryngeal tumors.

Clinical observation leaves us in doubt in many cases as to whether the tumor in question is carcinomatous or not. In such cases we can assure ourselves of the diagnosis only by removing a portion of the tumor by the endolaryngeal route, and submitting it to microscopic examination. But even after using this method we are often left in doubt concerning the diagnosis. The following points, according to Fränkel, speak in favor of carcinoma: Atypical epithelial strands, which dip down deeply into the connective tissue, and which divide into branches. These strands show an irregular structure, an absence of cells with basal nuclei, and an indistinct border separating them from the neighboring connective tissue. If, in addition to this picture, we see conglomerate masses, resembling giant cells and epithelial pearls, then the diagnosis of carcinoma is practically assured. The microscopic diagnosis of carcinoma is strengthened if we find atypical epithelial alveoli lying in the connective tissue, and having no connection with the surface epithelium. In order to make a diagnosis of carcinoma of the larynx, we must have a piece of tissue which shows not only the epithelium, but also the deeper connective tissue, therefore, in removing a piece for examination, one should be careful to remove more than just the superficial portion. In papillomata there is a moderate thickening of the epithelium, which grows towards the lumen of the larynx, and is marked off from the underlying connective tissue by a well-marked row of basal cells and a sharp border.

The diagnosis is most difficult in certain cases of pachydermia when epithelial strands are given off. Here we must be governed by the character of the epithelial cells and the boundary between epithelium and connective tissue. Whether or not in very difficult cases we should resort to exploratory thyrotomy, in order to clinch the diagnosis, the discoverer of the endolaryngeal method does not state. From the general surgical standpoint it is a method that merits earnest discussion.

It is very important to definitely limit the meaning of the term "radical operation." The larynx, and in particular, circumscribed, endolaryngeal carcinomata of the vocal cords, are, within certain limits, structures "sui generis." In every case we must ascertain in how far we are justified in instituting conservative methods. The general surgical conception of radical operations has taught a different lesson concerning malignant neoplasms than we have learned from laryngeal, circumscribed carcinomata. Let us take uterine carcinoma, for example. This in its first stages is a circumscribed disease, amenable to surgical treatment. Cure can be promised if the growth is limited, whereas later only palliative treatment is possible. In order to perform a radical operation, we must not only remove the tumor, but also all the tissue, through which the disease might have extended, pelvic and vascular cellular tissue, pelvic and lumbar lymph nodes. Such an operation can be performed only by the abdominal route. Every other attempt at a cure must be considered as incomplete and palliative.

The anatomical character of the tumor, whether it be a medullary or scirrhus tumor, is of importance, but of much more importance than this is the location of the tumor. Turning his attention to the structures of the neck, every surgeon will admit that in carcinoma of the vocal cords we can get permanent cures by excising the growth with some surrounding healthy tissue, provided the diagnosis is made early. With the pharynx and cervical portion of the esophagus, conditions are different, owing to the lymphatic apparatus, and here we must recognize that even small tumors must be removed very radically by means of an extensive operation in order to surely rule out a recurrence. Thus, frequently enough, in dealing with a tumor of the pharynx or esophagus we have to remove the larynx and the outlying healthy tissue, in order that the operation be truly a radical one. I remember in particular a case in which Prof. Julius Wolff removed the larynx. The patient died four and a half years later of carcinoma of the lungs, after having suffered first from a spontaneous fracture of the femur, due to carcinoma of that bone. In the scar and about the neck there was no sign of recurrence. In pharyngeal and esophageal tumors conditions are very favorable for metastases, both local in the cervical lymph nodes and general throughout the body.

Laryngeal carcinomata are either primary or secondary; the latter are by far the more uncommon, and usually occur as growths of contiguity from neighboring pharyngeal growths. The most frequent form of laryngeal carcinoma is the epithelioma (carcinoma platicellulare or keratodes). The medullary carcinoma are rarer and less dangerous. A third variety is the scirrhus. Occasionally we come across an adernocarcinoma. Epitheliomata occur mostly in the interior of the larynx, although medullary carcinomata may occur here also. The polypoid carcinoma may be considered as a special form. Diffuse carcinomata occur equally frequently in the larynx and in the pharynx. The carcinomata that occur in the ventricles of the larynx are very important. The larval form of carcinoma takes its origin in the depth and grows very slowly, so that when we diagnose it by seeing the surface the larynx may be largely destroyed and the case inoperative. I should like to cite the case of a larynx in whose interior an epithelioma developed, while on the other side of the retro-laryngeal mucous membrane a polypoid carcinoma grew.

The early stage of a laryngeal carcinoma may be a pedunculated tumor, with a fairly broad base. They remain stationary very often for years, and can be removed (seldom, it is true) by the endolaryngeal route or by laryngofissure.

In other cases the growth is rapidly progressive. The tumor attacks the submucosa over a large area, and in these cases we must resort to radical operation.

Symptoms, such as hoarseness, pain (radiating to the ear), and difficulty in deglutition may occur with other diseases (tuberculosis, syphilis, etc.). Dyspnea, cough, fetid breath, increased secretion, salivation, bleeding, putrid ulceration and necrosis, and softened lymph nodes are sure signs of carcinoma, but when they are present there is little hope of effecting a cure. The periods in the course of the disease are as follows: First period, formation of the tumor; second period, ulceration; third period, destruction, necrosis and putrefaction. Our aim should be to recognize the disease during the first stage.

I take the following position: If the carcinoma occurs and runs its course as a local disease, then it ought to be possible to treat it in this stage by local treatment. Virchow expressed this opinion, and every surgeon should heed it.

I cannot see why the pathologist and surgeon should not advise exploratory laryngofissure in all those cases where the microscopic examination leaves a particle of doubt concerning the malignancy of the disease.

The question has often been discussed of the advisability of deliberately shortening the lives of patients suffering from this terrible disease. I consider the prolongation of life to be the most honored task of the surgeon. For example, in gastric carcinoma, a gastro-enterostomy not only prolongs life five months, but relieves the patient of his terrible pains. In addition to prolonging life the operation provides for euthanasia, and this is a solemn duty that we owe to the patient.

Primary carcinoma of the cords, when operated upon, offers a good prognosis, and the same is true of carcinoma of the epiglottis. If the carcinoma occurs in any other position of the larynx, then a local excision is of doubtful value, and we must resort to a more radical operation.

Of the endolaryngeal carcinomata, the glandular variety is more malignant than pedunculated or broadly sessile tumors of the mucous membrane. They often are not diagnosed for a long while, and offer a bad prognosis even when subjected to radical operation. Small pharyngeal tumors often cause enormous lymph node tumors.

Regarding recurrence, one can make only a tentative prognosis. I have seen cases of endo-laryngeal tumors where everything looked favorable, and yet, where, after operation, terrible recurrences occurred. On the other hand, I have seen cases of from four to six years' duration, after extensive operations for endolaryngeal tumors, with resection of the tumor, lymph nodes and vessels. In one case of carcinoma of the epiglottis and base of the tongue, a subhyoid pharyngotomy was done; despite profuse hemorrhage, perfect healing occurred, with perfect function, three weeks after operation. No canula was used. A year later a lymph node metastasis was removed, after a four and one-half hour operation. Since then four years have elapsed, and the patient remains in the pink of condition. In a similar case, of a very small carcinoma of the base of the tongue, in a 68-year-old man, we removed an enormous secondary lymph node metastasis of the neck, which was adherent to the external and internal carotids and the internal jugular vein, and which extended from jugular to the base of the skull. Primary union resulted in three weeks. The patient refused to allow the tumor on the base of the tongue to be removed. He felt well for eight months, and the laryngologist who treated him wrote me that the tumor grew smaller. Later, however, the steady growth of the carcinoma killed the patient. We cannot explain the anomalous course that the disease took in this case, the tumor apparently ceasing to grow for a while, and then taking on growth again later. Regarding the danger of a radical larynx operation, we can only say that it shares with all other capital operations the dangers of anesthesia, shock, etc.

Diabetes, heart disease and old age are no direct contraindications, and I have repeatedly operated under these circumstances with success. A suddenly occurring and uncontrollable diarrhea, with collapse, sometimes start up in old people, even after the wound has healed. Such a state of affairs usually arouses a suspicion that we are dealing with a case of cirrhosis of the liver. I have observed one such case, where the diagnosis was confirmed by autopsy.

Sometimes an uncontrollable intestinal hemorrhage occurs after operations on the neck, larynx and pharynx. These hemorrhages are not necessarily due to carcinoma of the intestine, but may be due to venous congestion. Ligature of the carotid artery may cause hemiplegia of the opposite side of the body. Resection of the vessels of the neck may be followed immediately by unconsciousness, which later ends in death. In a series of cases healing progressed beautifully despite resection of the vessels, the vagus, and other cervical nerves. If the temperature rises immediately after the operation, and the pulse ranges from 130 to 140 and is irregular, then we must think of sepsis, iodoform intoxication and delirium cordis. In such cases we remove the bandage at once, take out the sutures and gauze, and repack with sterile gauze, or with a wet aluminum acetate gauze. Internally we give valerian, camphor and tincture of strophanthus, combined with oxygen inhalations and alcohol massage to the body.

Bronchitis we treat with moist packs, inhalations and frequent changes of the canula. An unexpected stoppage of the heart may occur within thirty-six hours after the operation, or three or four weeks later, after the wound has healed. I have been unfortunate enough to have such cases.

Emboli, such as we see after extirpation of the rectum and other pelvic operations, practically never occur after larynx operations. In general we allow our patients to sit up on the day of the operation.

The bandage and tampon is removed after six, eight or ten days. We change the canula only when the temperature and pulse indicate that a change is necessary. The patient is instructed to expectorate everything, and never to swallow. Nourishment, the digestion of the patient, cleanliness, hygiene of the sick-room, are all very important points. Day and night nurses are indispensible. After the first wound dressing the dressing is changed every twenty-four to forty-eight hours. We have avoided mediastinitis, even in cases where there was extensive necrosis present.

Where we have had to practise thyroidectomy we have seen myxedema, of a severe type, which disappeared permanently under treatment with thyroid extract. Profuse salivation and conical dilatation of the esophagus stump, with edema of the mucous membrane, are disagreeable complications. We have also repeatedly seen symptoms of irritation of the vagus manifested by attacks of reflex coughing and singultus.

Regarding the pathology of the tumors we have seen: One case of chondrosarcoma of the left part of the thyroid cartilage in a 12-year-old girl. After hemilaryngectomy the girl has remained cured for four years. One case of sarcoma of the cricoid in a 22-year-old pregnant woman. She has been cured for four years. In a 27-year-old woman we extirpated almost the whole larynx for a cavernous sarcoma. She has been well for nine years now. In another case we removed a cavernous sarcoma of the root of the tongue and the left sinus pyriformis A 54-year-old man, on whom I did a hemilaryngectomy, has remained well for thirteen years. In a 60-year-old man a laryngectomy for sarcoma resulted in death.

Only two of our cases were glandular carcinomata, and both cases required an extensively radical operation. One of these patients lived four and a half years, and then died of recurrence. The second case remains cured. We have seen two cases of carcinoma of the epiglottis. Prof. Fränkel removed the tumor in the first case, per vias naturales, and I removed the carcinomatous lymph nodes of the right side of the neck. The woman has remained cured for five years. The second case was a medullary carcinoma of the epiglottis and root of the tongue. A radical operation was performed, after a subhyoid pharyngotomy, and a large lymph node metastasis on the right side of the neck was removed. The patient now lives without her canula, swallows and talks as a healthy mortal should (five years have elapsed, and she is fifty-nine years old). All the other cases were extensively carcinomata, with nothing particularly interesting to note. Concerning their histology, we have already mentioned the cases of two carcinomata occurring in two different organs of the same individual.

In five cases we extirpated the vocal cords, after doing a preliminary laryngofissure, with excellent permanent results (cured for one and one-half, two and one-half, three and one-half and four years).

In other cases we did hemi or total laryngectomy, with or without extirpation of the pharynx. We performed thirty-five hemi-laryngectomies, three of which cases ended fatally; one within twenty-four hours, of heart shock, one independent of the operation (he developed a septic phlegmon of the gluteal region), and the third case died of pneumonia after five days had elapsed.

In one series of twenty-two cases we had only one death, and that was the result of iodoform intoxication, eleven days after the operation, on a 70-year-old man. Of twenty-seven cases of transverse resection and extirpation of the larynx and pharynx, combined with lmyph node and vessel extirpation, we had one death from secondary hemorrhage from the carotid. In one case we had a hemiplegia, after ligation of the carotid. The patient became unconscious, and died in five days. One can gain an idea of what excellent advances have been made from the fact that in our first series of nine cases we lost four, and that in our first ten cases (up to 1889) we recorded only two cures.

What we have said concerning carcinoma of the stomach holds good, even to a more marked degree, for the region of the neck. The operator prolongs life and renews hope, and if, after one and one-half years, recurrence develops, even then the operation has been decidedly worth while, according to our experience. For, in the meantime, the patient feels himself to be well and goes on living happily until the recurrence ushers in death.

We believe that statistics are of value only when cases are radically operated upon after having been diagnosed early. I can demonstrate more than thirty of my cases that are alive from one to thirteen years after operation. Of those that died, some lived eleven, eight, six and one-half, five and one-half, four and one-half and three and one-half years after operation, enjoying good health; and some of these died, not of recurrence, but of some intercurrent disease.

In one case there developed, eight years after hemi-laryngectomy, a carcinoma of the other half of the larynx, with lymph node metastases. Another operation was performed, after which the patient lived two years, dying at the age of 76. The operation prolonged his life eleven years.

Another 76-year-old man survived a pharynx and larynx extirpation for a year and a half. I have operated for tuberculosis on both sides of the larynx, and for cheesy necrosis of thyroid cartilage on one side of the larynx (twice). In these cases I resected with good results and secured healing without the use of the canula. Twice I did a total laryngectomy; and in one case, despite the operation, the patient died of cachexia. The other patient is well now, four years after operation.

In three cases I have done exentration of the larynx, excision of the epiglottis, and laryngoplasty with permanent laryngofissure. One of these cases has remained cured for seven years.

Four cases of diffuse papillomatous tumors in children were cured permanently by laryngofissure, without the use of the canula. Their speech is excellent. Transverse resection of the trachea, with subsequent suture, I have done eight times (for scars, after diphtheria or typhoid). Seven cases are healed; one died suddenly twenty-four hours after the operation. In one case we had an unfavorable functional result. I performed the plastic operation (using a skin, bone, periosteum flap from the sternum) three times, with excellent results. A demonstration of my pathologo-anatomic specimens will show that they appear to be as neatly and cleanly dissected as if they were dissecting-room specimens. Some specimens show larynx, pharynx, lymph node, cervical vessels, muscles, and part of the thyroid, all dissected out "en bloc." It is almost difficult to conceive that the former possessor of these organs can still live and be healthy.

In the case of a 42-year-old man, who suffered from carcinoma of the larynx, I removed the larynx, six tracheal rings, pharynx, esophagus, a bunch of lymph nodes, and a struma. The tracheal stump had to be drawn out of the anterior mediastinum, and the esophagus stump was fixed with silk sutures. After his wound healed he received a prosthesis for his pharynx and esophagus. Myxedema, severe nephritis and retinitis and tetany disappeared under the administration of thyroid tablets. He was operated upon one and a half years ago, and at present looks and feels well, and attends to business. We must not regard such a case as a curiosity, and feel "better dead than thus," for this man is an important element in the support of his family.

After extensive operations on the larynx and pharynx the question of nourishing the patient is an extremely important one. We introduce a stomach tube, through the nose, or through the wound, and we begin to feed one hour after the operation. We feed every hour, day and night, with from two to five ounces of wine, bouillon, egg, somatose, thick soups, and scraped meat. We give the food cool, instead of hot, to avoid starting up vomiting. We have found a combination of cocain, hydrochloric acid and pepsin to be excellent in checking vomiting. In order to avoid heart failure and bronchitis, we are careful to regulate the temperature of the room, and to have the patient inhale oxygen, and to practise deep inhalations of pure air. Thus we get a sort of lung gymnastic, which tends to prevent bronchitis. Strophanthus, valerian and camphor we use for the pulse, when it is indicated.

Stoerk noted, in his anatomical studies, that in some of the operations certain depressor nerves which run an abnormal course are cut. Their antagonists, the accelerator nerves, then come prominently into evidence.

Grossman says that every fatal result is due to irritation of the superior laryngeal nerve, an irritation that finally travels up and affects the vagus. Whether this theory be true or not, we do know that it is a fact that in a certain number of cases heart failure and death follow a laryngectomy within forty-eight hours after the operation. I myself have lived through such a case, where the operation was not very extensive, and where the autopsy revealed no marked change in the heart itself. On this account I operate very carefully, avoiding all unnecessary laceration, turning of the larynx on its axis, and irritations of the nerves, both during the operation and afterwards, in the course of the after treatment.

Smith makes interesting teleologic observations concerning the question whether the course of the recurrent laryngeal nerve is not of physiologic import. Davis explains the peculiar course of the recurrent, on the basis that a relationship exists between phrenic and recurrent. The phrenic is a long nerve, supplying the diaphragm; the recurrent nerve regulates the glottis. These two structures must work in harmony, and therefore the recurrent nerve is made long, so that the impulse reaches glottis and diaphragm at the same time. Elias says that the effect on the heart, after section of the vagus, is due to trophic influences, if infection has first been ruled out. Dogiel says that heart failure, after vagotomy, is due to heart exhaustion.

During the course of after treatment careful cleansing of the mouth and teeth and the administration of enemata and cathartics is very important. Before the operation the teeth should be cleaned by the dentist.

Most of the patients get out of bed, for an hour at a time, on the day of the operation. After three or four weeks they are allowed to go out for a walk. The wound heals externally in eight to ten days, in simple thyrotomy, without tracheotomy; but the endolaryngeal wound takes somewhat longer. Where tracheotomy, with tamponade of the larynx, has been done, wound healing requires twelve to eighteen days. In hemilaryngectomy, with or without laryngoplasty, the after treatment lasts fourteen to twenty-one days. Attempts to phonate are not permitted before the third week. Simple uncomplicated laryngectomy heals by primary union, in from fourteen to sixteen days. In many cases, however, complete after treatment lasts from four to five weeks.

We begin anywhere from the fourteenth to twentieth day, to have the patient attempt to swallow particles of food.

In cases where we have resected the vessels of the neck, and extirpated lymph node metastases, the after treatment naturally lasts longer, and may require eight weeks. In many of these cases we get excellent primary union.

Sometimes it is advisable to operate in two stages. If the larynx, pharynx and esophagus have been resected as far down as the mediastinum, and the patient runs no temperature, we need not change the bandage for six or eight days. The canula, however, has to be changed. As soon as we have removed the tampon and sutures we must dress the wound once or twice daily.

Not until the fourteenth to twentieth, and often not until the thirtieth day, is the pharyngeal opening contracted enough to permit of removal of the stomach tube and the insertion of my rubber prosthesis, to supply the pharyngeal and esophageal defect. The prosthesis consists of a stomach tube, with a rubber funnel on one end. The tube is put into the esophagus and pulled down until the funnel rests behind the base of the tongue. The whole thing is held in place by a silk thread. The patient can swallow perfectly with this apparatus, and can even speak through it in a loud whisper. If the tube does not become stopped up, or the pharyngeal opening does not become too large, it can remain in place six weeks, after which time it is changed. If the pharyngeal wound dilates, then the prosthesis must be removed and left out for a few days, after which it is put back in place again. If the wound cicatrizes around the prosthesis, then it is possible that the prosthesis must be permanently removed.

One of my patients, on whom I did a radical operation in June, 1903, has worn my prosthesis without changing it once in seven months. He eats well, speaks excellently, and has gained sixty pounds.

Some cases, those in particular in whom the epiglottis has not been removed, are subject to inflammation of the epiglottis, because of the irritation of the rubber. In these cases we change the prosthesis frequently and leave it out for a few days. This raises the question whether it is not better in all cases to remove the epiglottis. Some cases, however, bear the prosthesis well, despite the fact that they still have their epiglottis.

In cases where the base of the tongue was resected, and where a single vertical incision was insufficient, there remains quite a defect, limited above by the stump of the tongue, and below by the tracheal and esophageal stump. This defect must be closed in stages by the use of various skin-flaps.

Regarding the type of speech after these operations I may say that, after extirpation of the epiglottis, exentration of the larynx, and total laryngoplastic, with consecutive laryngoschism, the patients learn to speak very well. They also speak well after resection of a vocal cord and the surrounding tissue, for circumscribed carcinoma. A cylindrical scar takes the place of the lost cord and functionates in common with the healthy cord. The resulting voice is not melodious, but is strong and loud. The voice is about the same as the above-described, after hemilaryngectomy, especially if a laryngoplasty has been done according to the method I have described.

In laryngectomy, done according to the Billroth-Czerny method, only a few patients retain the voice-producing structures, and most of them can speak only in a whisper.

It is of particular interest, as Hans Schmidt has pointed out, that patients, robbed of an organ as important as is the larynx, can nevertheless, by practice and instinctive accommodation, learn to speak so well, despite the fact that there is no communication between the air-containing lung and the buccal or pharyngeal cavity.

The larynx may be considered as a double-tongued membranous pipe; voice is produced by the vibrations of elastic membranes. Voice, naturally, has its origin in the larynx only as long as the individual possesses that organ. If the organ is destroyed through obliterating scars, or through extirpation, then we are obliged to construct an artificial larynx, such as the ingenious one of Czerny-Gussentauer, made of a rubber or metal tongue, which is set in vibration by the stream of expired air, and produces tones deep in the pharyngeal, buccal and nasal cavities.

J. Wolff has attempted to produce tones by the use of a rubber tongue, obliquely introduced, regulated by a screw, and protected from buccal mucus by a sieve.

The artificial larynx strains the lung; it causes disturbance and irritation in swallowing, and therefore predisposes to recurrence in the neighboring tissue. Very often we can dispense with all artificial phonating apparatus, particularly since we know that parallel bars of tissue, which look like the vocal cords, and are situated where the cords originally were, can be set in vibration and produce sounds. Two scars, or two folds of mucous membrane, may, under circumstances, produce a spurious glottis, even in the pharynx. In one case a patient without a larynx spoke so distinctly that one could hear him sixty feet removed. This he did by means of the constrictor muscles of his pharynx.

In addition to the "chest" voice and the "fistula" voice, we have the whispered voice, "vox clandestina," which is not characterized by regular vibrations of air, as is the normal voice. The whispered voice is merely a sort of a murmur, and is produced by the rubbing of irregular blasts of air against the somewhat thickened (instead of the fine membranous) edge of the cords. During whispered voice the glottis is moderately narrow.

When our well known colleague, Hans Schmidt, now dead, showed a case of total laryngectomy (1888), who possessed spontaneous speech, despite the fact that there was no communication between his pharnyx and trachea, he excited general wonderment. Prof. B. Frankel explained the phenomenon on the ground that the patient swallowed air into his esophagus, and then set this air in motion with the pharyngeal muscles. Folds in the pharyngeal mucous membrane served as a cord that vibrated under the impulse of the expelled air.

Glassblowers and goldworkers also take in as much air as their mouth will hold, and then use the air for their work. In a similar fashion laryngectomy patients can fill their pharynx and esophagus with air, to be used in producing tones, by expelling it against the ridges and folds in the pharyngeal and esophageal mucous membrane.

This whole question has aroused a great deal of interest, since a great number of surgeons have adopted, with good result, my suggestion (and Zeller's, 1881) to resect the trachea, preliminary to laryngectomy, as a prophylactic measure against foreign body pneumonia. The suture of the tracheal stump in the lower angle of the wound permanently closes off the trachea from the secretions of the buccal and pharyngeal cavities.

If Frankel's explanation of Schmidt's case was correct, then, I argued, if I put one end of a tube in the nasophoryngeal space as far back as the tip of the uvula and inserted the other end, air-tight, in the tracheal stump, the patient could inspire through the nose and mouth, and could then expire in such a way as to produce tones in the pharynx, which would be distinctly louder than the whispered voice.

For patients in whom I have performed total laryngectomy, with subsequent plastic operation on the esophagus, I have constructed the following apparatus, in order to intensify their voice: A small rubber prosthesis, fitted with a valve, fits air-tight in the trachea. The valve opens with inspiration and closes with expiration. The expired air is conducted into a rubber tube, distal to the valve, and this tube is connected with a phonation contrivance shaped like an olive. The olive continues as a rubber tube, and this rubber tube the patient inserts through his nostril as far back as the uvula. The olive remains in the nostril. By blowing through this olive the patient can speak loud and plainly. The difficulty with this apparatus is that the tones set the skull bones vibrating to such a degree that they interfere with the patient's hearing, as well as with his sight and articulation.

In order to secure co-ordinate action between phonation and articulation we must lengthen the tube of the phonation contrivance. If the lungs act as a balloon and expel air into the apparatus, then we get phonation and articulation depending upon one and the same impulse. Through the kindness of our colleague, Th. S. Flatau, we have had phonographic records taken, which show a good result. Other authors, Stoerk, Hohenegg and Pean, have made attempts similar to ours, only they used air bags. What I am discussing here is the principle of creating artificial voice where there is no communication between the air passages and the naso-pharyngeal space, a principle which both physician and patient is called upon to develop. The apparatus that I have described is manufactured by the instrument maker Windler, of Berlin.

The simplest instrument is very often the best. Thus we get an excellent voice merely from leading a rubber tube from the trachea, through the nose, into the naso-pharynx. The patient can breathe comfortably through this tube, and with the expired air he can produce tones. A fundamental necessity is that the tube should go through the nose as far back as the uvula. The following mechanism, *e. g.*, can be constructed: Put one end of a rubber tube in the patient's nostril and the other end in the tracheal canula, by means of an air-tight joint. The respiration takes place through the mouth, or through the other nostril. The expired air produces tones in the pharynx, which result is a moderately loud whispered voice. This voice is sufficient for all purposes; if, however, the patient desires a louder voice, we can create it in the following simple manner: Somewhere along the course of the tube we switch in a phonation apparatus. This apparatus is set into vibration, and tones are produced by the expired air, and these tones are emitted as speech from the various organs in which the tube may end—mouth, nose, or lips. If the tube ends just in front of the lips, then we get a fairly loud voice, which is produced in a manner just the reverse of normal voice production, viz.: articulation occurs before phonation. I must admit that most of my patients do not care to use any phonation apparatus, being satisfied with the tones they produce with their unaided pharynx.

There are a certain number of cases who do not instinctively learn how to use their voice, and these cases Dr. Gutzmann teaches how to talk by having them practise certain exercises. He gets very good results. In all these cases the respiratory tract is entirely out of connection with the speech organs, and the patients are not burdered by having to carry any prosthetic apparatus. We avoid the hissing of air alongside the tracheal canula by taking taking a cast of the tracheal opening, and then having a prosthesis made, which fits in it and hugs the canula closely, so that it fits in the trachea air-tight.

We have collars, ties and rubber bibs made so cleverly that the patients who wear them appear as a normal, healthy person ought to appear. We have devoted a good deal of attention to this phase of the question, because some patients are extremely sensitive about their fellowmen discovering their scarred-up condition. By our present operative methods we avoid tracheal fistula with almost certainty. If one does occur, now and then, we close it, either by a plastic operation, or by a prosthesis. I shall not describe the various rubber rings and contrivances made to fit over the canula, for my method of taking a cast and then fitting a prosthesis air-tight over the tracheal opening answers all purposes. Claude Martin has described an artificial larynx, made according to the size and shape of the removed larynx. I shall merely refer to his original article in the "Monatschrift für Zahnheilkunde," September, 1902. I personally have never felt the need of the apparatus. It might be of use in those cases where, after extensively radical operations, large defects remain that we cannot repair by plastic work.

I never modify my plan of operation with the end in view of adapting a good prosthesis. First and foremost I am concerned with saving the patient's life. Cosmetic effects are of secondary importance. It may be that in the future the instrument maker and the surgeon will reach a compromise, for art is long and life is short.

My particular interest in laryngeal operations dates from 1879 to 1881, when, as assistant of v. Langenbeck, I published a paper on "Phophylactic resection of the trachea," together with Prof. Albert Zeller. The purpose of this paper was to show how, by a preliminary operation, we could avoid many of the dangers of pharynx and larynx operations. We advised transverse resection of the trachea and implantation of the lower end in a transversely made skin wound. Our conclusion was: "In extirpation of the larynx, or, in fact, in all operations, after which a foreign body pneumonia so frequently leads to death, a prophylactic resection of the trachea offers a certain guarantee against the occurrence of an aspiration pneumonia. If we are careful, both during the operation and after treatment, to guard against an aspiration into the air passages, we are still liable to the danger of septic mediastinitis and secondary hemorrhage. I have already considered the best means of avoiding these complications."

W. Lublinski (Observations on the remarks of Sir Felix Semon, on the radical operation for laryngeal new growths) states that up to the year 1881, 52.6 per cent. of patients died during the operation, or during the after treatment. From '81 to '91 the mortality fell to 46 per cent. The mortality has gradually fallen, partly as a result of my method of operating, until it has reached 18 per cent. Von. Bergman, Kocher, Mikulicz, and their pupils publish cases with a mortality of 8 to 11 per cent. I myself published a series of cases where the mortality was 4.5 per cent. Semon, Butlin, Chiari, Fränkel and Jurasz have published excellent results following thyrotomy and endolaryngeal operations. In considering plastic work done on the pharynx and esophagus we must give the first place to v. Hacker and v. Hochenegg. Foederel, Küster, v. Bruns and Enderlen have also gotten beautiful results in plastic work on the trachea. Of course we must consider the fact that statistics are very often deceptive. Yet we can honestly say that a laryngectomy which in 1881 was followed by a mortality in 52.6 per cent. may now be done with as great a degree of safety as an interval appendectomy.

For a certain group of tumors of the pharynx and base of the tongue, where we fear an aspiration pneumonia, and where, for example, a subhyoid pharyngotomy is necessary, we think it advisable, after first making a low tracheotomy, to pack off the aditus of the larynx with gauze, or to sew the epiglottis or a skin-flap over the larynx.

In smaller operations, even after a subhyoid pharyngotomy, we can avoid performing a tracheotomy in the manner that has been described by so many authors. However, this matter does not interest us here, where we are merely dealing with the question of avoiding aspiration pneumonia.

Barring accidents and constitutional anomalies, laryngectomy, performed according to my method, may be counted as an operation relatively free from danger. The radical operation, indeed, seems to be safer than the so-called atypical partial operations; for these latter operations we as yet have no definite technique.

Early diagnosis and radical operation are the two important things on which the fate of the patient depends. In both these directions we have made enormous advances. By our modern methods we can and must rule out tuberculosis, syphilis, scleroma, and scars due to various other diseases.

My work on resection, mobilization and suture of the trachea, as well as my work on laryngo—esophago—and pharyngoplastic, has won fundamental significance. It has been extended and modified. In the first place, we have succeeded absolutely in avoiding aspiration pneumonia, and thereby have been able to exclude one of the most frequent causes of death.

It is of particular significance to me to be able to determine that as a result of my work on resection of rather extensive portions of the trachea, we are able to secure excellent functional results. We have considered it our duty to those patients who get a recurrence to lessen their pain by means of morphine, and to do what we can for them by means of the X ray, arsenic, etc. We see often enough that patients live a surprisingly long while after the onset of a recurrence; that part of the tumor undergoes regressive changes; that an abscess cavity cleans up and heals, and that erysipelas disappears. I have also repeatedly used cancroin; it never has done any harm, and in some cases the tumor growth came to a standstill, just as we sometimes see in carcinomata. The matrix of the tumor remains, however, and unfortunately recurrence may occur at any time. Work along these lines, and the erection of cancer hospitals, like von Leyden's institute, is a blessing to humanity. He who will discover the etiology of successful treatment of tumors, with a serum or other internal medication, will earn for himself a monument from all humanity. Until we progress that far, however, the cure of carcinomata is left to the knife of the surgeon. Of course, we all hope for the time when the surgeon's bloody work will be merely a matter of past history.

In 1854 Bernard v. Langenbeck first conceived the idea of laryngectomy for malignant growths of the larynx, and tried the operation in his Berlin clinic; since then a half century has elapsed. Twenty-five years ago he spoke as follows before the German surgical congress, concerning extirpation of the pharynx: "Gentlemen—It may seem bold of me to direct your attention to an operation with which, up to the present, I have had only bad results. But exactly on this account I speak of it, because I think our combined efforts will serve to introduce into surgical practice an operation whose performance is surely safe, even if its results are dangerous."

As late as 1900 so great a master as Kronlein reported that in growths of the hypo-pharynx, all operative methods for recovery are very small. He operated on eight cases, and six of these eight died, four from pneumonia, one from exhaustion, and one from hemorrhage. Possibly his results have been better since then.

In 1903 I reported twenty-seven cases of pharynx resection, done in the course of laryngectomies (Swansea annual meeting, British Medical Association), with only two deaths. One case died as a result of ligature of the carotid, developing hemiplegia and unconsciousness, which led to death in five days. The other case died of hemorrhage from the carotid.

Since then, up to April 7, 1904, I have done seven other operations, three cases of extirpation of larynx, pharynx and esophagus, two cases of extirpation of the larynx and pharynx, with resection of the tongue. These five patients were discharged cured. The sixth patient, in whom I had to resect a large lymph node metastasis, and who had phthisis, died two months after operation from erysipelas migrans. The seventh case was a 69 year-old man, who died three days after operation.

Thus I lost four cases in a series of thirty-four, and three of these four cases died of accidental causes, not attributable to any faulty operative technique. The fourth case died of bronchitis.

Thus Langenbeck's hope has come true, and we have discovered the secret on which depends successful results in pharyngectomies. Moreover, the method of operation should be characterized as an absolutely new and original one. Laryngectomy and pharyngectomy, done for malignant growths, have become fairly safe operations, and the postoperative result is a satisfactory one.

We doctors, who follow earthly sorrow with open eyes and sympathetic heart, when we can no longer cure must console the patient and provide for euthanasia.

If, however, we can do things by means of surgery, which only yesterday were impossible, then we should never lose sight of the task that our function is to prolong life.

Many patients are preserved for their family, and enabled to follow their pursuits in life, despite deforming operations; they are grateful for what medicine has done for them, and they agree with the truly philosophical words of resignation of the poet, Hieronymous Lorm:

"Though all my life surrounded be,
  By inky night and trouble,
One single ray of sunshine still,
  My heart's ease serves to double."

XXXIII.

INFERIOR ETHMOIDAL TURBINATE BONE.*

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Method of Investigation.—The results presented below are based upon a study of about 1,000 specimens obtained in the dissecting-room and the Warren Museum of the Harvard Medical School. Most of the specimens represent dissecting-room material intact and in a good state of preservation, and the balance consists of about seventy skulls in which the bony outer wall of the nasal fossa was not broken. Some of the specimens were studied before and after maceration. In no instance was the clinical nasal history known. I am indebted to Professor Thomas Dwight for the opportunity to carry on this investigation. I owe much to Percy Emerson Brown, M. D., for his skill in obtaining photographs of the specimens.

Nasal Fossa.—The nasal fossæ are two more or less symmetrical cavities placed side by side and separated from each other by the septum of the nose, which forms the internal wall in either instance (Figs. 30, 32, and 35). The fossa is open in front and behind at the anterior and posterior nares and is bounded above and below and laterally by four walls. The floor is much wider than the roof and the lateral walls are the most extensive. The nasal fossæ are surrounded by four other fossæ—above is the cranial fossa; laterally, the orbital fossæ; and below, the cavity of the mouth (Fig. 33).

The floor of the nasal fossæ will not be considered. Certain features of the roof and internal wall which bear important relations to the inferior ethmoidal turbinate will be referred to. The outer wall is not only the most intricate, but also is of the greatest surgical importance. This outer wall is bounded chiefly by the internal surface of the body of the superior maxilla and its nasal process, and by the internal surface of the lateral mass of the ethmoid bone, but, in addition, this wall is completed by the nasal, lachrymal, and inferior turbinate bones, and internal pterygoid plate of the sphenoid bone (Figs. 1-10). The most striking feature of this wall is its irregularity made by two large bony projections called the inferior turbinate bone and the inferior ethmoidal turbinate ("middle turbinate"). There are always one or more lesser projections which are called superior turbinate bodies, but these are of little clinical importance.

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*Lothrop, "Frontal Sinus and Anterior Ethmoid Cells," Annals of Surgery, 1898.

The ethmoid bone is usually described as presenting a median vertical plate (lamina perpendicularis) which forms part of the nasal septum, and across the top of this is a horizontal, perforated plate (lamina cribrosa) which separates the nasal and cranial fossæ. On either side of the lamina perpendicularis, suspended from the lamina cribrosa, is a cuboidal, cellular mass of bone called the "lateral mass." The outer wall of the lateral mass is bounded by a flat plate of bone, called the os planum, forming part of the inner wall of the orbit. The inner wall of this lateral mass is very irregular and forms a part of the outer wall of the nasal fossa. The irregular bony cells between these two walls constitute the greater portion of the anterior and posterior ethmoidal cells (Figs. 30, 32, 35, and 36). All the ethmoidal turbinate bodies or bones are projections from this internal wall (Figs. 8, 9, 41, and 44). The lower projection is called the inferior ethmoidal turbinate ("middle turbinate"), and is the structure under particular consideration in the following pages.

Internal Wall of the Lateral Mass (Figs. 1-25, 40-47).—The internal wall of the lateral mass is a more or less quadrangular area of bone, which serves both as an internal boundary for many of the ethmoid cells and likewise as a portion of the external wall of the nasal fossa. It consists entirely of a portion of the ethmoid bone. The upper border corresponds to the line of junction of this surface and the lamina cribrosa and is carried forward anteriorly on to the inner surface of the nasal process of the superior maxilla, and posteriorly to the ethmoid spine of the sphenoid bone. It is slightly convex towards the septum corresponding to the narrow portion of the roof of the nasal fossa (one to five millimetres). The inferior border is free and corresponds to the inferior border of the inferior ethmoidal turbinate (to be described later) and the anterior border of this surface corresponds to the anterior border of this turbinate. The posterior border is vertical and is the line of junction between this surface and the anterior surface of the body of the sphenoid bone. It forms a vertical groove and is called the spheno-ethmoidal recess (Figs. 4 and 12).

The surface, as a whole, is rough, and its most striking feature is the presence of an oblique deep groove which, if continued, divides it into two triangles. The groove is known as the inferior ethmoidal fissure (all lateral views). The lower triangle is the inferior ethmoidal turbinate ("middle turbinate" of the nose). The upper triangle may present an intact surface, but is frequently subdivided by a fissure known as the superior ethmoidal fissure (Figs. 25 and 43) and rarely by another fissure (fissura suprema) (Fig. 9). According to the presence of these fissures there will be a variation in the number of superior ethmoidal turbinate bodies. This upper triangle forms the proper internal wall of most of the posterior ethmoidal cells. Its surface is somewhat convex towards the nasal septum, and posteriorly it looks backward towards the sphenoid bone. The surface is rough in consequence of numerous small vertical grooves and foramina for branches of the olfactory nerves (Figs. 5 and 11).

Inferior Ethmoidal Fissure (Lateral views).—The inferior ethmoidal fissure is always present and runs obliquely downward and backward across the posterior half of this surface of the lateral mass. The anterior extremity starts just below the centre of the surface, about fifteen to twenty centimetres from the anterior border, and intersects the posterior border. Below, it forms the posterior part of the upper boundary of the inferior ethmoidal turbinate, and its upper border is made by the free edge of the next ethmoidal turbinate ("superior turbinate"). Its posterior extremity is open and ceases near the sphenopalatine foramen, but it is closed in front. Usually two or three posterior ethmoidal cells open into it by means of ostia which are apt to be larger than ostia of anterior cells. The floor of the fissure is made by the horizontal position of the inferior ethmoidal turbinate (Figs. 31 and 35) and looks upward and backward. It is comparatively broad and may extend to the os planum (Fig. 31). Pus from these cells is usually directed towards the pharynx. The fissure ends abruptly, but in certain cases it is prolonged as a shallow groove for a variable distance on the internal surface of the inferior ethmoidal turbinate (Figs. 15, 19, and 22), or may be carried forward into the turbinate body itself and there dilated into a cell, as will be described later (Figs. 3, 23, 45-47).

The average inferior ethmoidal fissure measures twenty-six millimetres in length and about six millimetres in width.

Superior Ethmoidal Fissure (Figs. 9, 14, 25, 40-44).—This fissure is absent in at least sixty per cent. of the cases. When present, it has the same general direction as the inferior ethmoidal fissure. It is about half as long and is situated a short distance above it. It is a groove, deeper in the centre, and it terminates posteriorily in the spheno-ethmoidal recess. It is exceptional for it to possess the ostium of more than one posterior ethmoidal cell. In very rare instances there may be still another groove above this known as the "supreme ethmoidal fissure."

When only the inferior fissure is present, there are two ethmoidal turbinate bodies; the presence of the superior fissure adds a third body. Hence, counting the inferior turbinate bone, there are three turbinate bones, so called, in about sixty per cent. of the cases, and the presence of four such bodies is not unusual, but a fifth is very rare. Only the inferior turbinate bone and the inferior ethmoidal turbinate ("middle turbinate") have any real practical importance. The spheno-ethmoidal recess is a vertical groove just in front of the anterior surface of the body of the sphenoid bone where the ethmoidal fissures terminate behind, and into which opens the sphenoidal sinus.

Ethmoid Cells (Figs. 30, 32, 33, 35, 36, 39, and 47).—The ethmoid cells will be considered only in a general way. They are most conveniently divided into two groups—the anterior and posterior cells. They are contained in whole or in part in some portion of the lateral mass of the ethmoid bone and completed by portions of facial bones, which need not be considered here. All cells whose ostia open below the inferior ethmoidal turbinate are called anterior cells, those which open above are called posterior cells. In a general way, the anterior cells are in front of the posterior cells, although they may overlap extensively. The division into a middle group situated opposite the os planum does not appeal to the writer.

The anterior cells have been described in a previous work* with considerable detail, and were summarized as follows:

A series of cells whose ostia are situated along two ethmoidal fissures (homologues), viz.: along the hiatus semilunaris, and the fissure between the bulla ethmoidalis and the inferior ethmoidal turbinate. There are three groups of cells:

(*a*) A group represented by the bulla ethmoidalis and its subdivisions.

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(*b*) A group of cells crowding into the posterior angle of the frontal sinus which drain into the infundibulum, the turbinate fossa, and the upper part of the fissure above the bulla.

(*c*) A group of cells opposite the lachrymal bone which drain into the infundibulum.

The Posterior Ethmoid Cells.—In general, these cells are situated behind the anterior cells. They are bounded internally by the internal wall of the lateral mass (Figs. 30 and 35), in the ethmoidal fissures of which are situated their ostia. Posteriorly these cells are in close contact with the sphenoidal sinus and may run back external to it. The sinus, however, always has its own ostium, which opens into the spheno-ethmoidal recess. Externally these cells are limited chiefly by the internal wall of the orbital fossa (Fig. 33). Above they enter a varying distance between the two laminæ of the horizontal portion of the orbital plate of the frontal bone (Figs. 2 and 14). They are larger and less numerous than the anterior cells and usually number from four to seven. There is a cell in front of the sphenoidal sinus, opposite the superior turbinate, which is generally the largest, and it may equal this sinus in size. The ostia of these cells are few. There may be one to three in the inferior ethmoidal fissure, and one in the superior fissure if this fissure happens to be present. These cells almost never open into the spheno-ethmoidal recess. The superior turbinate body may consist simply of a ridge of bone on the wall of a large cell, (Figs. 31 and 39.) There is sometimes a prominence made by this cell called the "tuberculum ethmoidale posticum" (Fig. 43, No. 4). A posterior cell may communicate with the cell of the inferior ethmoidal turbinate (Figs. 45, 46, and 47). The total capacity of the posterior cells is usually less than that of the anterior, although, individually, they may be larger. Their ostia are so large and their drainage so good that they are less liable to be the seat of suppurative disease. The ethmoidal cells are absent at birth (Fig. 26), but develop slowly, and are not completely formed before the age of twenty years.

The Inferior Ethmoidal Turbinate (all lateral views).—The inferior ethmoidal turbinate bone is the anteroinferior triangle marked off on the internal wall of the lateral mass of the ethmoid by the inferior ethmoidal fissure and a line projected forward and upward to the anterosuperior angle of the surface. The lower part of the turbinate hangs more or less vertically as a free lamella of bone (Figs. 30 and 32). It is commonly called the "middle turbinate bone," but it is a part of the ethmoid bone, and is more accurately termed the inferior ethmoidal turbinate.

The general shape of this lamella of bone is triangular, and it presents for descriptive purposes two surfaces, internal and external; three borders, superior, anterior, and inferior, and three angles, posterior, superior, and anterior.

Internal Surface.—The bony surface is rough, but when covered with mucous membrane it is comparatively smooth. It is triangular and narrow posteriorly, and presents a varying degree of convexity towards the septum. The anterior and upper portion is rather flat, but inferiorly this lamella of bone curves sharply outward. At the inferior ethmoidal fissure this surface turns a sharp angle so as to form the floor of the fissure, and here it faces upward and backward (Figs. 31 and 35). Its length depends upon that of the fissure, and its breadth is commonly that of the lateral mass. It may be separated from the orbital fossa by the inner wall of the latter, or some posterior ethmoid cells may intervene. It may be twelve to thirty millimetres long and ten millimetres wide. This surface directs the pus from these cells into the pharynx. Towards the lower part of the internal surface are grooves for branches of the sphenopalatine artery.

The surface, as a whole, is rather smooth, but occasionally presents well-marked horizontal grooves, which are in the centre of the surface, and do not extend into the ethmoidal fissure (Figs. 9, 18, 19, 22, 26, 40-44). If very deep they form a well-marked gutter, and if broad, they tend to reduce the normal convexity of the surface. The anterior extremity occasionally terminates in a pocket, but never in a distinct cell. In only one instance has there appeared a "middle turbinate" which presented a true internal concavity rather than a convexity (Fig. 34). Unlike the external surface, there are no cells on it. It is unusual for a groove to measure more than twenty millimetres long by three millimetres deep and three millimetres wide. They are rarely multiple. The lips of a prominent groove can be observed from the anterior nares and the region explored with a probe.

Occasionally the internal surface may present one or two elevations. The lamella at the agger nasi may be unusually elevated so as to make a prominence called the "tuberculum nasoturbinale," which is simply a well-marked agger nasi

(Figs. 5 and 8). When the superior and inferior ethmoidal turbinates meet at the beginning of the inferior ethmoidal fissure there may be a prominence made by an ethmoid cell; this is called the "tuberculum ethmoidale posticum" (Fig. 44, No. 5). The "tuberculum ethmoidale anticum" has been noted in connection with the superior turbinate (Fig. 43, No. 4).

Internal to the turbinate is the septum nasi, with which it should not be in contact. Usually there is a space of two to five millimetres between them called the olfactory fissure (Figs. 30 and 38). They may be in contact as a result of a malposition of the turbinate or because it contains a large cell, or there may be a deviation of the septum or a cartilaginous or bony spur. It is a clinical observation that the development of the turbinate depends upon the amount of space necessary to fill. For example, if the septum is crowded to one side so as to touch the turbinate, this body is apt to recede, and the two surfaces do not remain in contact. Meanwhile, the concavity on the opposite side of the septum is more or less filled by a compensatory hypertrophy of the opposite turbinate. Most of the increase is due to a hyperæmic condition of the turbinal covering. Opposite the greater part of the inferior ethmoidal turbinate is the lamina perpendicularis of the ethmoid. If the turbinate is large, it may be opposite the triangular cartilage; but the posterior extremity is always opposite the upper part of the vomer. As a result of trauma, the opposing surfaces may become adherent by bands varying in extent, particularly if both surfaces are wounded.

External Surface (Figs. 30, 32, 37, 38, and 39).—The external surface faces outward and presents in general a concavity most marked in the lower horizontal half. This is called the sinus of the turbinate (sinus turbinalis). Towards the superior angle the surface is flat, and near the posterior angle the upper portion of the surface looks downward and forward. This surface is rougher than the internal surface, and commonly presents depressions or pockets and orifices leading to cells which will be considered later.

The external relations of this surface are very important and complicated. Opposite the upper angle is a space which varies in size, and it has been termed the turbinate fossa. In fifty per cent. of all cases the frontal sinus opens here without communicating with the infundibulum (Figs. 30 and 32). Some of the ostia of anterior ethmoid cells are found here. Opposite the turbinate sinus are the bulla ethmoidalis, hiatus semilunaris, and processus uncinatus. The outline of the bulla frequently corresponds to the concavity of the sinus, but the bulla may be flat, consisting of a simple lamina of bone, may be generally enlarged and symmetrical, or may be drawn out into a nipple like process (Figs. 37, 38 and 39). Hence, its proximity to the turbinate will vary. The general direction of the uncinate process conforms roughly to that of the free borders of the turbinate, but at the extreme upper limit of the anterior border of the turbinate these two structures are usually in contact. The average bulla is about ten millimetres long, and posteriorly its surface is continuous with the under surface of the turbinate. The relation between the bulla and sinus turbinalis is fairly constant, but the former may be so large as to fit into the sinus. Occasionally a band of mucous membrane passes across from one to the other.

The turbinate may be directed outward so sharply as to come in close proximity to the structures external to it, and may occasionally come in direct contact with them. The space may be narrowed, furthermore, by an hypertrophied condition of the mucous membrane of by the presence of polypi. These conditions are of great importance, for the ostia of difference sinuses and cells may be obstructed thereby.

Superior Border.—This is the longest border, and it runs obliquely upward and forward across the internal wall of the lateral mass, dividing it into two triangles as mentioned above. It has a bony attachment throughout its extent. Beginning posteriorly at the sphenopalatine foramen, it crosses the superior turbinate crest of the palate bone, thence along the inferior ethmoidal fissure, whence it is continued in the same direction as an imaginary line to the cribriform plate, and then towards the median line to reach the internal surface of the nasal process of the superior maxilla. This is the superior angle (Fig. 4). All of the lamina below this line is treated as the inferior ethmoidal turbinate for descriptive purposes. In the disarticulated ethmoid bone, the anterior border is very obvious.

Anterior Border.—This border extends from the superior angle downward to meet the inferior border at the anterior angle. It is the shortest border. It passes downward for a variable distance on the internal surface of the nasal process of the superior maxilla, often in conjunction with the anterior extremity of the uncinate process. Thence it continues in a general downward direction as a free border, slanting forward or backward to reach the anterior angle. This free angular portion of the turbinate is called the "operculum" (Figs. 4, 5, 6, 8, 9 and 14). The prominence of the operculum depends upon the length of the free portion of this border. It is open to inspection from the anterior nares.

Inferior Border.—The inferior border connects the anterior and posterior angles. It is generally horizontal and is free for its whole extent. It is fairly regular and follows the outward curled portion of the turbinate. This border is thickened, grooved and channelled for vessels, and towards its anterior end it contains at times dense bone tissue. The border may be deeply notched (Figs. 13 and 41, Nos. 1 and 3). The bone tissue is more dense here than elsewhere in the turbinate. A part of this border can be seen from the posterior nares (Fig. 31).

Posterior Angle.—This angle is at the junction of the superior and inferior borders and is situated just below the sphenopalatine foramen, close to the internal plate of the pterygoid process. The bony angle is flat, and, as a rule, it is not accentuated by the mucous membrane, as is the corresponding angle on the inferior turbinate bone. It is on the same level as the Eustachian tube and in the same vertical plane as the angle of the turbinate below. In contrast to the angle of the lower turbinate a sling can rarely be made to catch on the posterior angle of the inferior ethmoidal turbinate (Figs. 21 and 23).

Superior Angle.—This is placed obscurely at the junction of the superior and anterior borders near the roof of the nasal fossa just internal to the ostium frontale. Just external to it is the turbinate fossa, which may be a comparatively wide space and contain the openings of the frontal sinus, the frontal bulla, and some of the anterior ethmoidal cells. Just below it is the prominence of the agger nasi, which corresponds to a turbinate in certain of the lower mammalia (Figs. 5 and 8).

Anterior Angle.—This angle is at the junction of the anterior and inferior borders. It is the only free angle, and its prominence depends upon the length of these borders; hence, it may be more or less a right angle (compare lateral views). This portion of the turbinate acts as a sort of cover and is called the "operculum." It is open to inspection from the anterior nares. It may be thick or thin, and is much dilated by an extensive cell formation which has been termed "concha bullosa." The operculum hangs vertically, and may be directed outward or inward.

General Structure and Variations of the Turbinate.—The bony lamella is comparatively thin, particularly at its point of greatest convexity, but along the inferior and anterior borders it is frequently very dense. Throughout the greater part of its extent it is not thicker than an egg-shell, and contains numerous perforations (Figs. 1-10). The turbinates in the aged are extremely thin and brittle. One specimen (Figs. 32 and 33) is unique, and the only example found in which the turbinate is made up of comparatively thick, dense bone.

Variations in the outline have been noted, likewise the occurrence of one specimen which presented a concavity towards the septum (Fig. 34). There is considerable uniformity in size. A relatively large turbinate is shown in Fig. 14.

The turbinate may appear to be absent, as seen in Figs. 16 and 17, but in every instance there is either a bony ridge or membranous flap to mark its presence. Ordinarily, when viewed laterally, the bulla and uncinate process cannot be seen, but not infrequently the uncinate process is exposed, and only in cases of extreme atrophy is the inferior border of the turbinate higher than the bulla (Figs. 16, 17, 43, No. 3, and 44, No. 3). The middle turbinates of opposite sides are never precisely alike, and they often present marked asymmetry (Figs. 30 and 32). The cellular structure will be considered below.

The inferior ethmoidal turbinate is covered with a thin periosteum, a small amount of loose connective tissue, outside of which is mucous membrane possessing ciliated, columnar epithelium. In the mucous membrane and the connective tissue, especially on the internal surface and lower border, are numerous cavernous spaces which can be filled with blood. The various passages can be thereby much narrowed. The condition is known as hyperæmia, and this tissue is an example of "erectile tissue." Ciliated mucous membrane lines the structures which have been considered above, including all the cells connected with the ethmoid bone.

The blood supply of the middle turbinate is derived chiefly from branches of the sphenopalatine artery, and these run forward along the inferior portion, forming an extensive anastomosis.

The sensory nerve supply is derived chiefly from branches of the superior maxillary division of the fifth pair of cranial nerves. A few branches of the olfactory nerve are distributed in the vicinity of the superior angle, extending down a short distance on the internal surface of the turbinate.

Cells of the Inferior Ethmoidal Turbinate (Figs. 3, 20-24, 27-39, 45-47).—Ordinarily, the middle turbinate consists of a thin, curved lamella of bone which is a part of the ethmoid bone. It is thinnest opposite the sinus turbinalis, and its thickest portion is along the inferior and anterior borders in the vicinity of the inferior angle. This thickened portion may be more or less cancellated and tunnelled for vessels, and is sometimes of sufficient width as to present an inferior surface. Small exostoses sometimes occur.

As will be seen below, it is a common occurrence for this lamella of bone to contain cells of different sizes and shapes, located in different portions of the turbinate. A cell located in any portion of the turbinate can be properly called a middle turbinate cell, and all such cells will be considered below. These are strictly ethmoid cells and could be classed as anterior or posterior, as will be observed below.

There is much confusion in the literature as to the origin and nature of these cells, which I believe is due primarily to a lack of investigation of a large number of normal turbinates, and, secondly, to errors by clinicians who remove portions of cell walls which have been changed by pathological processes, and are led to believe that all such cavities are pathological. They are usually described as "osseous cysts." In anatomical works the first mention of cells of the middle turbinate was made by Santorini, and later similar observations were made by Zuckerkandl. So far as I can learn, no other very extended anatomical investigation has been made. Dupuytren appears to have made the first clinical report of middle turbinate cells.

As has been noted, the following statements and conclusions are based on the study of about one thousand middle turbinate bones, obtained from dissecting-room subjects and museum specimens. The turbinates of very few children could be obtained, but a considerable number of new-born infants were examined. By far the greater number of specimens represent the adult condition, including all ages. The sex in these cases was not followed closely, and there seemed to be no reason for believing that cells appeared more commonly in one sex than the other.

Age.—There are no ethmoid or middle turbinate cells at birth. The ethmoid cells begin to develop at about 5 years of age, but I discovered no turbinate cell in children. They were equally common in all ages of adults. Comparing the cells of all ages, they appeared to reach their normal development synchronously with the ethmoid cells, and then remained stationary unless altered by disease or the thinning of bone in old age.

Occurrence.—Of 1,000 inferior ethmoidal turbinates, eighty-nine contained a cell, making about nine per cent. of all cases. In a previous smaller series of cases, all of which are included in the above, the percentage was eighteen, hence it was a matter of chance that the early specimens contained cells. In 6.7 per cent. only a single cell was present, in 1.3 per cent. two or rarely more cells coexisted. In ten of the 1,000 cases, or 1 per cent., both middle turbinates of the same subject contained cells. The cells were slightly more frequent in the right than in the left turbinate.

No cell was discovered in the inferior turbinate. In the superior turbinate region, the lamella of bone which constitutes this turbinate is often very thin and narrow, so that the turbinate is practically a strip of bone crossing a posterior ethmoid cell. The prominence of the superior turbinate often depends upon the size of a posterior ethmoid cell.

Location of Cells in the Turbinate.—Almost without exception the cell is situated somewhere in the anterior half of the turbinate. If it occupies any part of the posterior half, it is always one of the bullous type of large cells which occupies the anterior half as well (Figs. 24, 28, 37, 38, 45-47). More commonly a single cell is located near the central part of the turbinate in the vicinity of the anterior extremity of the inferior ethmoidal fissure (Figs. 20-23). When the cell is very large, the condition has been called "concha bullosa." Only in this type does the cell extend for any degree to the inferior border or to the inferior angle. In most cases there remains a strip of cancellated bone along the anterior and inferior borders (Fig. 30).

Occasionally the cell may extend towards the superior angle, forming part of a large anterior ethmoid cell, thus reaching the roof of the nasal fossa (Figs. 44, No. 4, 46, Nos. 1, 3, and 5). The frontal sinus may communicate thus with a cell in the turbinate. More often the turbinate cell communicates with a large posterior ethmoidal cell so as to reach the level of the lamina cribroso (Figs. 24, 45, No. 6, 46, No. 2, and 47, Nos. 5 and 6). As a rule, the turbinate cell occupies a position between the anterior angle and anterior end of the inferior ethmoid fissure encroaching upon the area of the turbinate sinus from in front and above (Figs. 37 and 38).

Types of Cells.—Cells of the turbinate may be classified according to their size, small or large, or according to whether they open into the middle meatus or the inferior ethmoid fissure. The size of cell bears no relation to the situation of its ostium.

Small cells are common near the anterior extremity of the ethmoidal fissure, extending a variable distance into the turbinate; these open into the fissure, and they can be recognized by a small oval prominence on the internal surface of the turbinate (Figs. 3, 20, 21, 23, 45-47). The cavity within the fissure seems to be carried down into the cell.

The cells possessing these characteristics resemble closely in every way anterior and posterior ethmoidal cells.

Another variety of small cells is associated with the sinus turbinalis, and these cells are often multiple. It would seem as though small pockets opening into the sinus became deeper and the ostium smaller until a well recognized cell was formed. They are essentially diverticula from the sinus. The mucous membrane makes these cells more pronounced. These smaller cells opening into the sinus are common and have very little clinical importance. They are near the inferior portions of the turbinate, and do not communicate with the anterior ethmoid cells. Examples are seen in Figs. 37, Nos. 2, 6, 11, 14, 15, and 38, Nos. 3, 5, 6, 11.

The larger cells observed in the inferior ethmoidal turbinate are of fairly common occurrence, and it is to this type that the name "concha bullosa" has been applied. About 5 per cent. of all middle turbinates possess such a cell. It is this condition which is of peculiar surgical importance, and this variety includes most of the clinical cases reported. There is no relation between the size and location of these cells and the location of the ostium.

As a rule, the cell occupies the anterior half of the turbinate, whence it may extend upward or backward according to its size. The turbinate is wide, thus increasing the normal convexity towards the septum nasi, and at the same time encroaching upon the turbinate sinus. The larger cells extend fully to the anterior angle, but sometimes a strip of cancellated bone remains along the inferior and anterior borders (Fig 30). Frequently these cells extend well towards the posterior angle, and superiorly they may communicate by a large passage with posterior or anterior ethmoid cells, so as to form a large chamber extending to the level of the lamina cribrosa. In many instances these turbinate cells are obviously a part of an ethmoid cell which is situated partly in the lateral mass and the turbinate. Ethmoid cells and frontal sinus may drain into a middle turbinate cell (Figs. 45, No. 3, and 47, Nos. 4, 6). The cells are oval and flattened laterally.

The size of the cells varies. The following table shows the size and relative variations of the three dimensions of some of the larger cells:

Millimeters. Height.	Millimeters. Length.	Millimeters. Width.
18	11	12
17	20	7
20	15	8
14	18	11
20	25	8
8	10	5
31	25	14 (Fig. 24)
17	28	12 (Fig. 28)
25	15	12 (Fig. 22)
19	29	10 (Fig. 38, No. 8)
22	30	11 (Fig. 37, No. 9)

Ostia.—Every ethmoid cell without exception possesses an ostium. An occasional clinical case has been reported where it is claimed that the cell possessed no ostium, and the reason for such conclusion is readily understood when the location of the ostium is considered.

Location.—Whenever the cell opens above the middle turbinate bone into what is usually called the superior meatus of the nose, the location of the ostium is constant, irrespective of the size of the cell. It is situated at the extreme anterior end of the inferior ethmoidal turbinate, more or less concealed, when viewed laterally, by the lamina of the superior turbinate (Figs. 21 and 24). It is oval and from two to four millimetres in diameter. The ostium of a large cell does not differ much in any respect from that of a small cell. In all instances it is placed at about the highest level of the cavity, and therefore it is most unfavorably placed to facilitate drainage from any cell within the turbinate. All turbinate cells which communicate directly with posterior ethmoid cells open thus. Of all turbinate cells about forty-five per cent. open into the inferior ethmoidal fissure *i. e.*, the region commonly termed the superior meatus.

Middle turbinate cells may open below the turbinate into the middle meatus, and of all cases about fifty-five per cent. communicate thus with the nasal fossa. A few of the smaller cells may open into any portion of the turbinate sinus, but these are usually small diverticula from the sinus and of comparatively slight importance. The ostium of the larger cells occupies a very constant position on the external surface just above the turbinate sinus. It is opposite a point above and anterior to the upper portion of the ethmoid bulla (Figs. 22, 29, 30, and 33). In shape it is commonly crescentic with the convexity downward, and may measure from three to ten millimetres in length. Its plane is parallel to that of the turbinate, but the plane of the ostium opening above the turbinate is at a right angle to that of the turbinate. This type of ostium is at the upper portion of the cell and offers poor drainage. A somewhat larger percentage of the bullous type of cell opens into the middle meatus. It is the cells opening by this route that communicate with the anterior ethmoid cells, the frontal sinus, and frontal bulla.

If a bullous turbinate is removed by snare or forceps, the line of fracture is below or through the ostium, hence the removed portion may contain a large cell without any apparent ostium.

The disposition of the ostia varies when multiple cells are present in the same turbinate. Both cells never open above but both may open below (Fig. 47, No. 1) the turbinate, or there may be an ostium on either side (Figs. 23 and 45, No. 5). When the cells are arranged one in front of the other, the anterior cell generally opens into the middle meatus, the posterior into the superior meatus (Fig. 23). Of thirteen turbinates containing comparatively large double cells, in no instance did both cells open above the turbinate, but in three cases both communicated with the middle meatus, and in ten cases one cell opened above and the other below the turbinate. Occasionally the turbinates of opposite sides contain a cell, both communicating with the nasal fossa by the same (Fig. 36) or different (Fig. 33) routes.

The walls of the cells vary in thickness within narrow limits. The lateral walls are usually thinner than the wall of an ordinary turbinate, and if the cell is of the bullous type and extends fully to the anterior border, the front wall is equally thin. Where the cell is small and occupies the upper portion of the turbinate, the proper lateral walls of the cell are thin, but the remaining portion of the lamella of the turbinate is unchanged. Partitions between cells are thin.

The mucous membrane which lines these cells does not differ from that lining the general cavity in the ethmoid region. It is devoid, however, of the erectile tissue which is characteristic of the internal surface of the turbinate. It consists of cilated columnar epithelium and basement membrane, together with some loose connective tissue in which are distributed lymph and blood vessels and glands. The osseous tissue is characteristic of that belonging to the ethmoid bone. As a result of pathological processes, such as catarrhal inflammation, hypertrophy, polyps, and atrophy, the appearance of the mucous membrane may be profoundly altered.

Relation of Cells to Surrounding Structures.—Internal to the cells is the septum nasi (Figs. 30 and 35), and, according to the size of the cell and the angle of the turbinate and the curvature of the septum, the cell may be in contact with the septum. Adhesions are rare.

External to the cell we have the bulla and uncinate process, together with the important ostia in the vicinity. A cell of any considerable width is apt to obstruct these ostia, giving rise to symptoms according to the ostium involved. There is no structure immediately in front of the cell, but posteriorly there is often a portion of the bulla, if prominent, and the accentuated concavity of the turbinate sinus (Figs. 37 and 38).

Recognition of the Presence of Middle Turbinate Cells.—The vicinity of the anterior angle of the middle turbinate is practically always in view when examined from the anterior nares. An unusual width of this region may be due to a deviation or undue curling of the turbinate or to the presence of a cell . The bullous type can be seen filling up the apertura pyriformis (Fig. 27), and perhaps obstructing the olfactory fissure, or even extending from the septum to the bulla. Only in exceptional instances could the presence of a cell be detected by posterior rhinoscopy (Fig. 31). The location of the ostium could not be determined in a normal cell.

Origin of Cells in the Inferior Ethmoidal Turbinate.—Embryology shows that at birth there are no cells associated with the ethmoid bone (Fig. 26); that at four to five years cells begin to develop by the pushing in of pockets lined with mucous membrane (Fig. 25); that at puberty the ethmoid cells are fully developed; that the cells do not change materially in health, but that in the aged they may become a little larger in consequence of atrophy of their walls. The inferior ethmoidal turbinate or "middle turbinate" is a porition of the ethmoid bone, and its development depends upon that of the rest of the bone.

Anatomical research of a large number of normal middle turbinates reveals the following facts: That in about 9 per cent. of all turbinates examined bony cells were present; that these cells frequently communicated with either anterior or posterior ethmoid cells, and were occasionally multiple; that the cell could lie partly in the lateral mass and partly in the turbinate; that the structure and appearance of the cells resemble those of ethmoid cells; that the cells very rarely showed the presence of any pathological process; that all these cells have ostia; that frequently the superior turbinate consisted of a narrow lamella or a sharp ridge on a posterior ethmoid cell. No closed bone cavities or bone cysts were discovered in any of the turbinate bones.

There are two theories among clinicians as to the formation of cavities or cells in the inferior ethmoidal turbinate:

(1) That these are closed osseous cystic cavities produced by an inflammatory process giving rise to an exaggerated curling of the bony lamella until it has formed a bony cavity or osseous cyst. In these instances there is claimed to be an absence of lining mucous membrane and a particular arrangement of osteoclasts and osteoblasts.

(2) That these cells already exist in the turbinate as normal structures, and may be the site of subsequent inflammation with consequent pathological changes.

The following conclusions are drawn as regards the occurrence of these turbinate cells, based chiefly on anatomical investigation:

That the presence of turbinate cells in 9 per cent. of all cases is not a pathological condition; that these cells are normal in every respect; that they are usually not large, but that even the largest cells do not differ from the anterior and posterior ethmoid cells, and develop in the same way and are really ethmoid cells; that the presence of most of the cells could not give rise to any symptoms, but that even without any pathological changes the cell may become large enough to cause obstruction to respiration, to interfere with the sense of smell, and to give rise to reflex symptoms in consequence of pressure; that as a result of inflammation secondary changes may take place in the mucous lining and also in the bony wall of the cell, whereby its general character and size may be altered, particularly when the ostium becomes closed; that cells of considerable size must exist without their presence being known until the patient seeks relief for nasal obstruction, when a cell may be discovered complicating an acute catarrhal process which was just enough to make complete an already partial obstruction; that in cases of empyema of such a cell where the ostium remains closed, we have practically an abscess cavity, the walls of which are capable of great distention.

THE CLINICAL HISTORY OF MIDDLE TURBINATE CELLS.

The salient clinical features of these cases will be reviewed briefly, based upon the reported cases and a recent well-marked example occurring in the practice of the writer.

Occurrence.—There are about thirty authentic cases on record. All cases occurred practically in adults, the youngest patient being 16 years old. Although about three-fourths occurred in females, there is no reason why one sex should be prone to the condition. More than half the cells contained air and the walls were not the seat of any pathological process. There were five well-marked examples of empyema of the cells, while other cases were complicated by the presence of hypertrophied tissue and polypi within the cavity. They were about equally distributed on either side, and in two instances both middle turbinates were involved.

Symptoms.—In all probability most turbinate cells give rise to no symptoms. They are subject to the same changes undergone by other ethmoid cells in health and disease.

There are two general groups of symptoms which may be caused by middle turbinate cells—one due to the size of the cell, the other due to the presence of inflammation. Both factors may be present simultaneously. The cell may be of sufficient *size* to cause the following symptoms:

There may be complete or partial obstruction to respiration, generally unilateral, which persists irrespective of the presence or absence of a rhinitis. This gives a sense of pressure. Mouth breathing may be necessary.

Pain is often referred to one side of the face and is of a neuralgic character. This may be distributed along any of the branches of the trifacial nerve, manifested as pain along the supra-orbital nerve, about the eye, or in the teeth of the superior maxilla.

There may be a nasal quality to the voice.

The sense of smell may be interfered with.

There may be headache and occasionally dyspnœa on exertion.

Reflex nervous symptoms have been reported as due to the pressure of the turbinate on neighboring structures.

No authentic reports of external nasal deformity due simply to an enlarged turbinate cell are on record. Such enlargement may cause a deviation of the septum and distort the structures external to the cell, causing secondary symptoms in the antrum and frontal sinus. Photophobia, epiphora, and exophthalmos are said to accompany the condition.

In general it may be said that a non-inflamed turbinate cell causes no symptoms, but that otherwise the chief complaint is that of unilateral nasal obstruction with a sense of fulness and some pain in the nose.

Whenever such a cell becomes inflamed the character of the symptoms changes. Until the onset of these symptoms there may have never been any trouble caused by the cell. The symptoms due to inflammation may supervene on those already existing in consequence of pressure. The symptoms of acute rhinitis with obstinate nasal obstruction commonly cause the patient to seek medical advice, when the true condition may be observed for the first time. The obstruction may remain obstinate, and if the ostium is occluded, an empyema of the cell follows because the retained contents of the cell become infected. The usual changes due to suppuration in mucous membranes follow, until eventually the cell ruptures with or without bony rarifaction and cell enlargement. The persistence of hypertrophy and polypoid degeneration favor the obstruction and suppurative process, and the nasal discharge persists. Crusts collect and there may be odor. A suppurative process well established in such a cell is apt to become chronic because of the unfavorable location of the ostium for drainage.

Diagnosis.—It is usually difficult to diagnose the presence of a small middle turbinate cell which is not the source of any discomfort. If the cell is in the upper portion of the turbinate, its presence cannot be established. Only the bullous type of cell can be determined with any degree of satisfaction. Through the anterior nares, a tumor presents in the apertura pyriformis, with rounded outline and occupying the position of the inferior ethmoidal turbinate ("middle turbinate"). A small probe can be made to pass between it and the nasal septum and externally between the tumor and the outer nasal wall. It is immovable and hard, although its covering mucous membrane may be hypertrophied. The wall may be thin and bend under the pressure of the probe. The diagnosis is confirmed if a probe or other instrument breaks through the wall and enters a cell cavity. Pus may be made to escape from an opening made in the cell in cases of empyema. In a case of empyema of the bullous type of cell, operated recently by the writer, the cell wall was thin and very membranous. In this instance, pressure on the cell with a probe caused an excess of pus to escape from well above the turbinate, showing that the ostium was situated at the inferior ethmoidal fissure. The diagnosis of the presence of multiple cells would be very difficult.

A differential diagnosis should include the following conditions, which will be simply enumerated: Polypi. Hypertrophy of mucous membrane. An abnormally prominent ethmoid bulla or other ethmoid cell. Cysts of the mucous membrane of the turbinate. Abnormally broad curvature of the turbinate. Malignant tumor. Osteoma of turbinate. Cell of turbinate.

Treatment.—The treatment of any condition due to the presence of a cell in the inferior ethmoidal turbinate presents no difficulties and offers the hope of permanent relief. The part can be thoroughly anæsthetized by means of cocaine, and the hemorrhage carefully controlled during operation by means of a solution of adrenaline chloride.

The cell may be removed by means of the snare or any cutting instrument. It is probably wise to remove all of the cell. This can be done at one time with the snare, provided the cell is small; but if the cell is very large, a portion of it usually remains behind. This may be removed subsequently with cutting forceps, or, if it does not press on the structures laterally, it may be left after the interior has been carefully curetted.

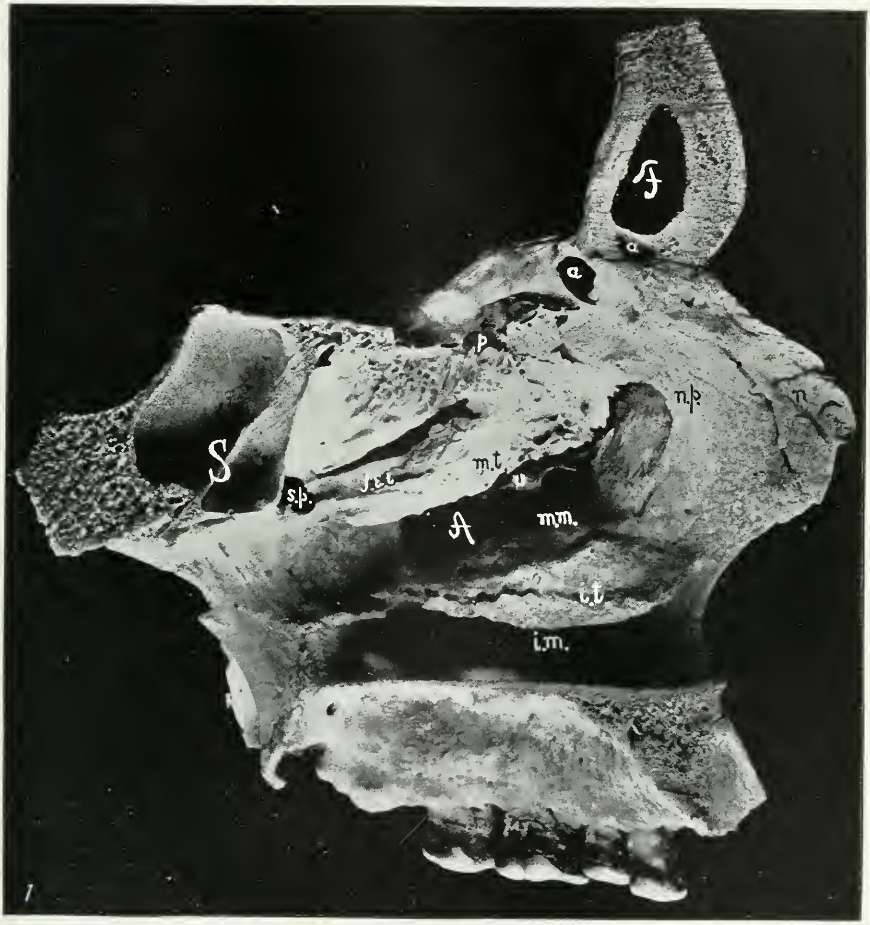

Fig. 1.—Outer bony wall of left nasal fossa; dotted line marks the roof of fossa. **F**, frontal sinus; **S**, sphenoidal sinus; **n**, nasal bone; **n. p.**, nasal process of superior maxilla; **a**, **a**, broken anterior ethmoid cells; **p**, posterior ethmoid cells; **s. p.**, sphenopalatine foramen; **f.e.i.**, fissura ethmoidalis inferior; **m.t.**, niddle turbinate; **A**, hiatus leading to antrum; **U**, uncinate process; **m.m.**, middle meatus; **i.t.**, inferior turbinate; **i.m.**, inferior meatus.

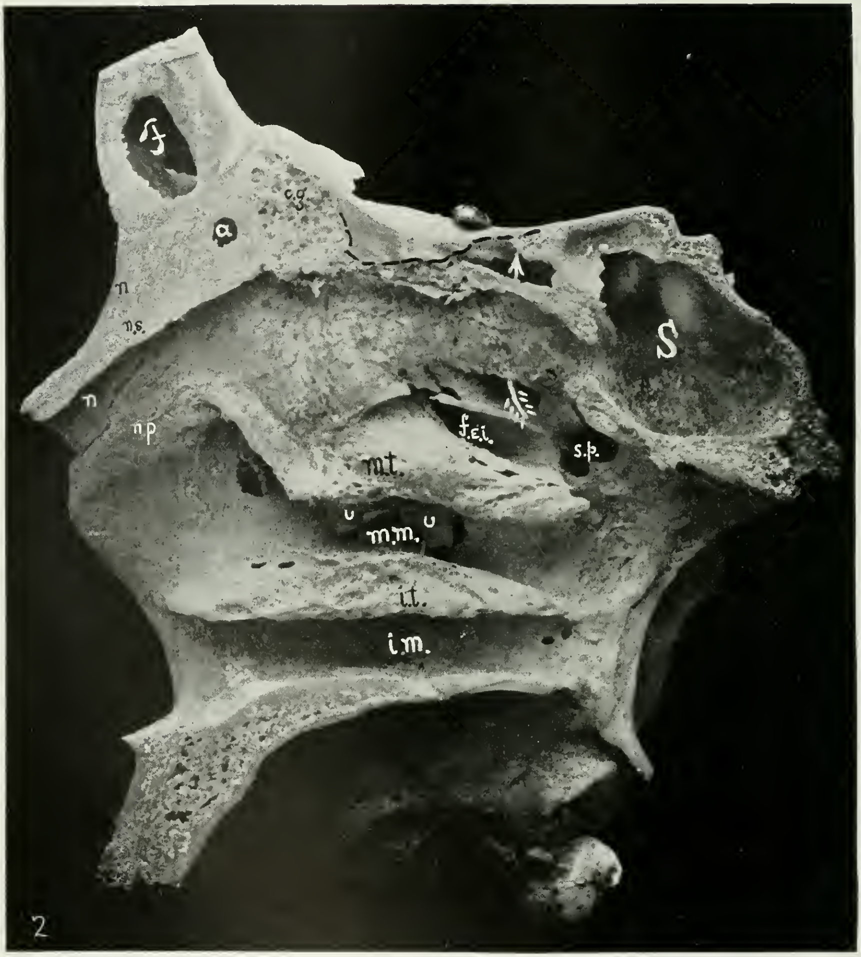

Fig. 2.—Outer bony wall of right nasal fossa; dotted line marks the roof. **F,** frontal sinus; **S,** sphenoidal sinus; **s.p.,** sphenopalatine foramen; **f.e.i.,** inferior ethmoid fissure. Arrow enters a posterior ethmoid cell from a middle ethmoid fissure. **a,** an anterior ethmoid cell which makes a frontal bulla; **n,** nasal bone; **n.s.,** nasal spine of frontal bone; **n.p.,** nasal process of superior maxilla; **m.t.,** middle turbinate bone, **m.m.,** middle meatus; **U,** uncinate process; **i.t.,** inferior turbinate; **i.m.,** inferior meatus.

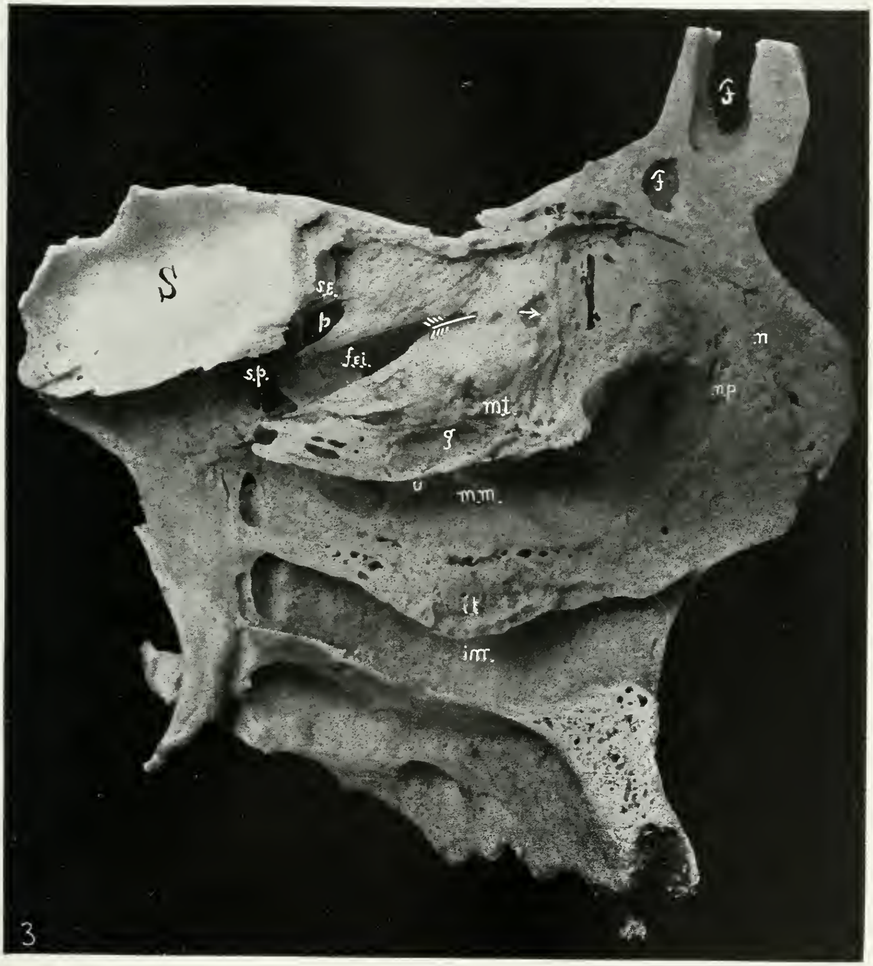

Fig. 3.—Outer bony wall of left nasal fossa. **F, F,** frontal sinus; **S,** sphenoidal sinus; **n,** nasal bone; **n.p.,** nasal process of superior maxilla; **s.e.,** spheno-ethmoidal recess; **p,** ostium of a posterior ethmoidal cell; **s. p.,** sphenopalatine foramen; **f.e.i.,** fissura ethmoidalis inferior, from which an arrow passes forward through an ostium into an anterior ethmoid cell just above the middle turbinate; **m.t.,** middle turbinate; **g,** groove on internal surface of middle turbinate; **m.m.,** middle meatus; **U,** uncinate process; **i.t.,** inferior turbinate; **i.m.,** inferior meatus.

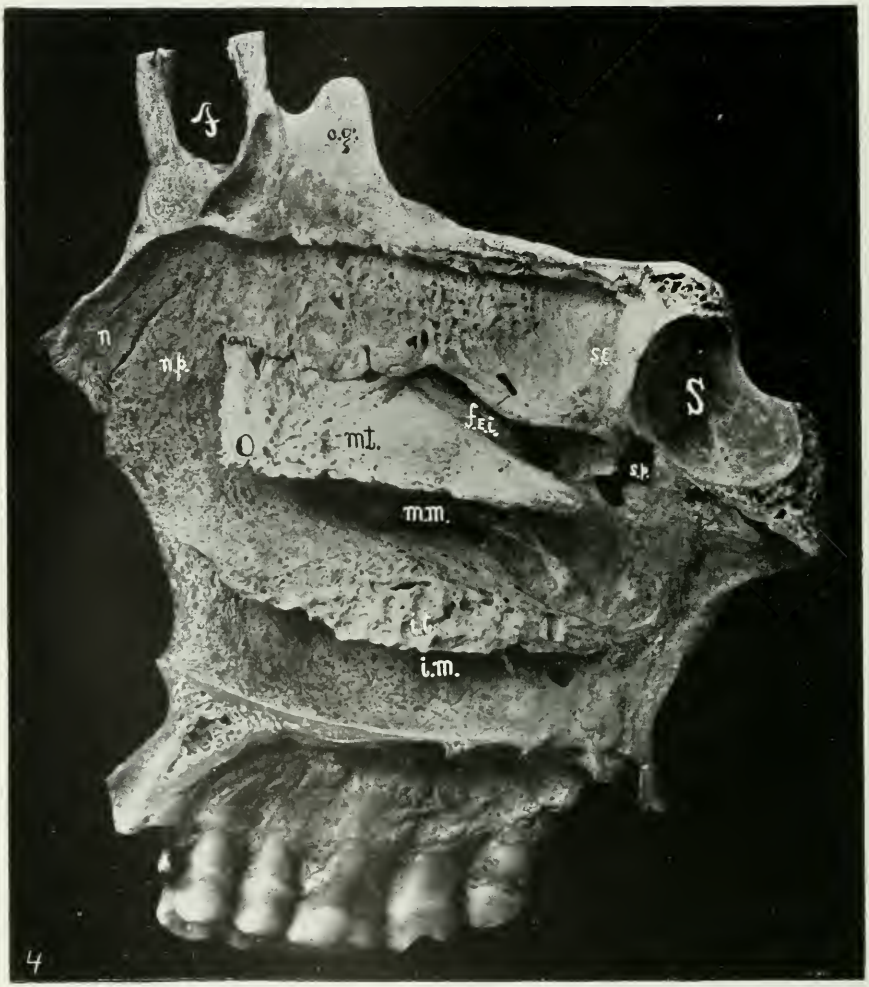

Fig. 4.—Outer bony wall of right nasal fossa. **F**, frontal sinus; **S**, sphenoidal sinus; **s.e.**, spheno-ethmoidal recess; **n**, nasal bone; **n.p.**, nasal process of superior maxilla; **s.p.**, sphenopalatine foramen; **f.e.i.**, fissura ethmoidalis inferior; **m.t.**, middle turbinate; **O**, operculum; **m.m.**, middle meatus; **i.t.**, inferior turbinate; **i.m.**, inferior meatus; **a.n.**, agger nasi; **c.g.**, crista galli.

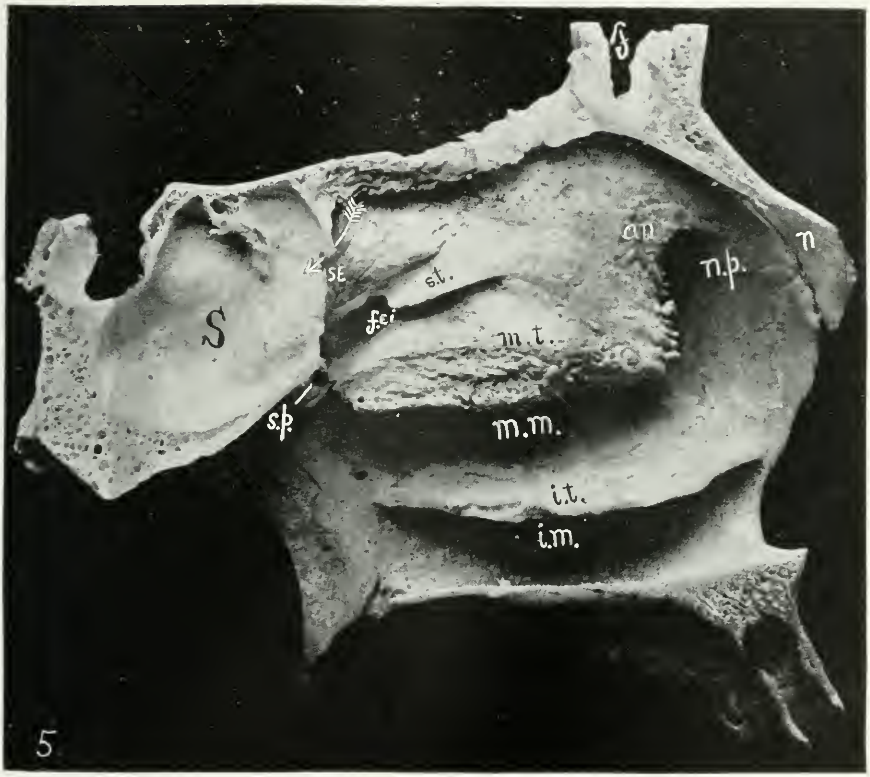

Fig. 5.—Outer bony wall of left nasal fossa. **F**, frontal sinus; **S**, sphenoidal sinus, into which passes an arrow through the ostium sphenoidale; **s.e.**, spheno-ethmoidal recess; **s.p.**, sphenopalatine foramen; **s.t.**, superior turbinate; **f.e.i.**, fissura ethmoidalis inferior; **m.t.**, middle turbinate; **O**, operculum; **a.n.**, agger nasi; **i.t.**, inferior turbinate; **i.m.**, inferior meatus; **n**, nasal bone; **n.p.**, nasal process of superior maxilla.

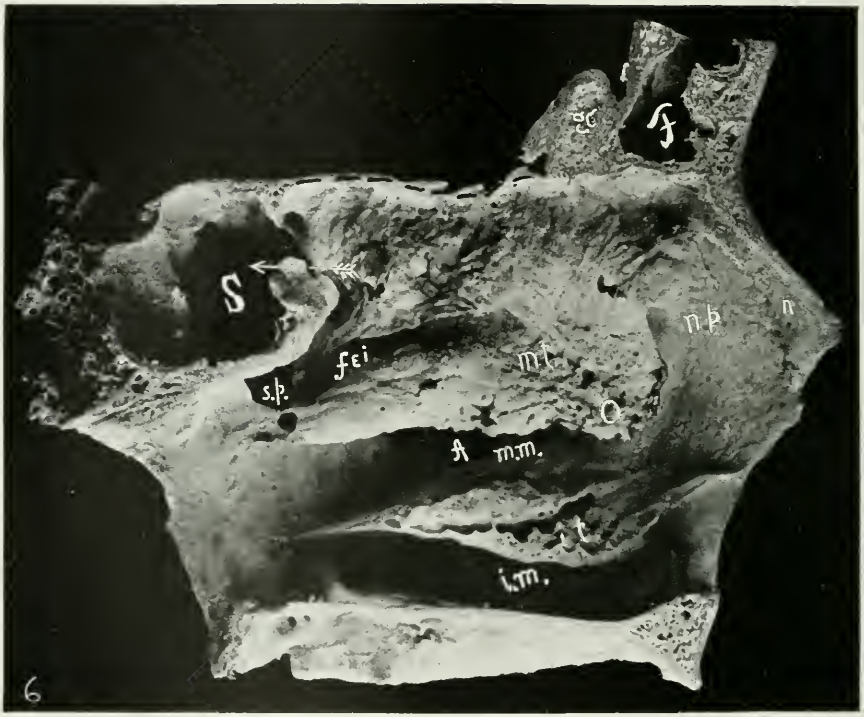

Fig. 6.—Outer bony wall of left nasal fossa; dotted line marks the roof. **F,** frontal sinus; **S,** sphenoidal sinus, into which an arrow enters through the ostium sphenoidale; **c.g.,** crista galli; **s.p.,** sphenopalatine foramen; **f.e.i.,** fissura ethmoidalis inferior; **m.t.,** middle turbinate; **O,** operculum; **m.m.,** middle meatus; **A,** hiatus leading to antrum; **i.t.,** inferior turbinate; **i.m.,** inferior meatus; **n,** nasal bone; **n.p.,** nasal process of superior maxilla.

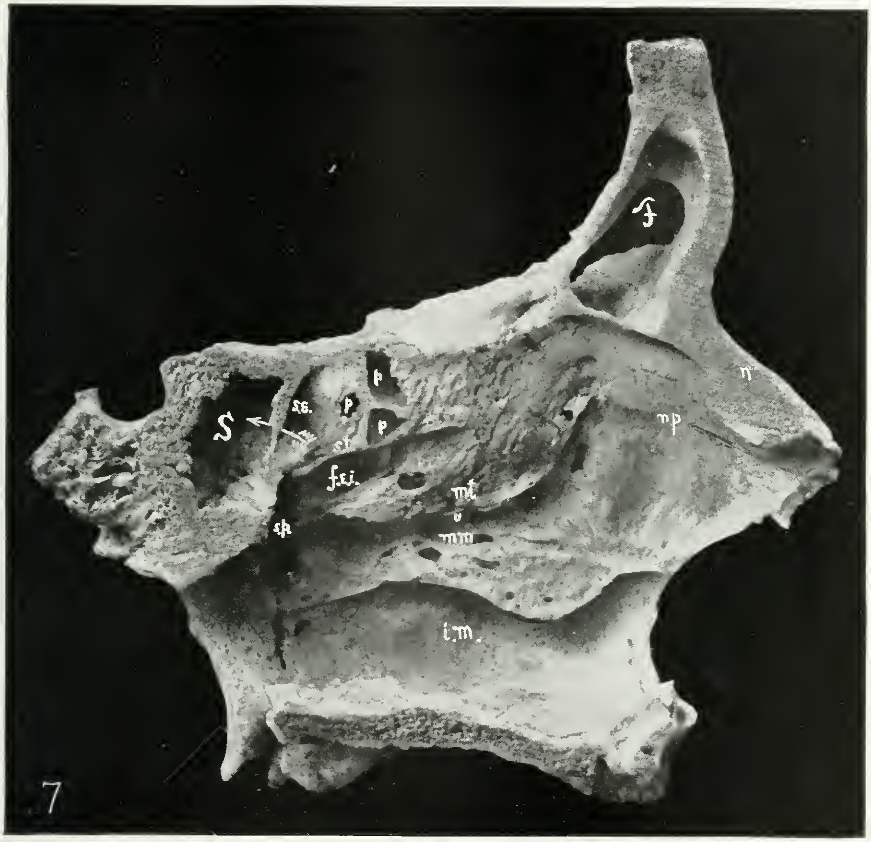

Fig. 7.—Outer bony wall of left nasal fossa. **F**, frontal sinus; **S**, sphenoidal sinus, into which an arrow points passing through the ostium sphenoidale; **n**, nasal bone; **n.p.**, nasal process of superior maxilla; **b.p.**, broken posterior ethmoid cells; **s.t.**, superior turbinate; **f.e.i.**, fissura ethmoidalis inferior; **s.p.**, sphenopalatine foramen; **m.t.**, middle turbinate; **U**, uncinate process; **m.m.**, middle meatus; **i.m.**, inferior meatus; **i.t.**, inferior turbinate.

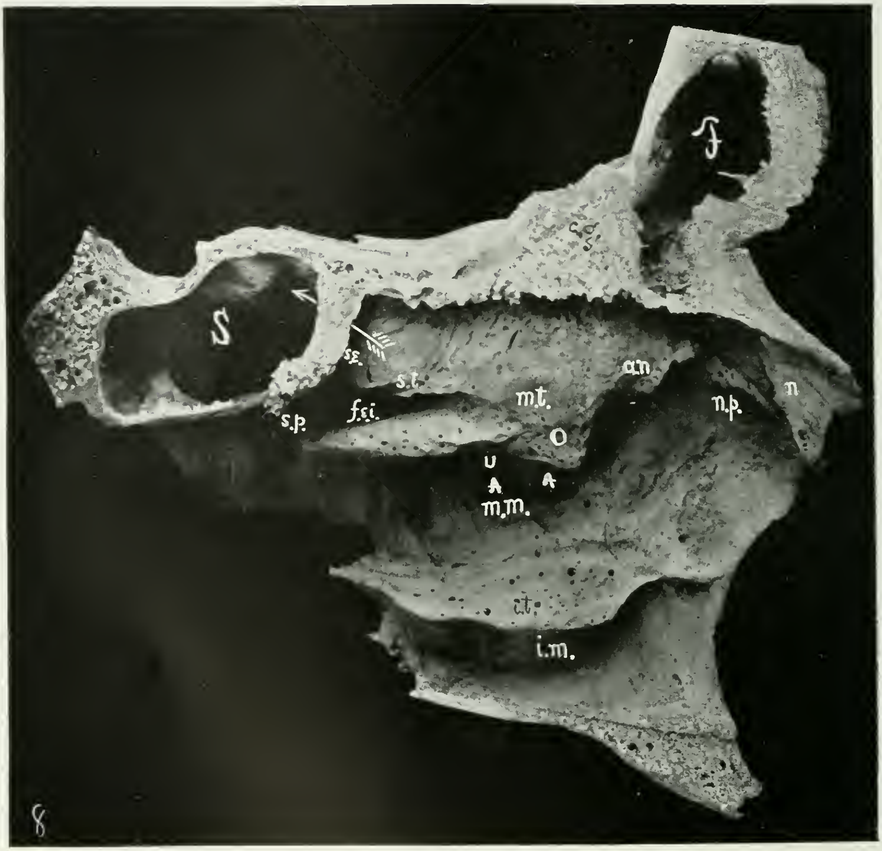

Fig. 8.—Outer bony wall of left nasal fossa. **F**, frontal sinus; **S**, sphenoidal sinus, with arrow directed through ostium sphenoidale; **n**, nasal bone; **n. p.**, nasal process of superior maxilla; **a.n.**, agger nasi; **c.g.**, crista galli; **s.t.**, superior turbinate; **m.t.**, middle turbinate; **O**, operculum; **i.t.**, inferior turbinate; **s.e.**, spheno-ethmoidal recess; **f.e.i.**, fissura ethmoidalis inferior; **s.p.**, spheno-palatine foramen; **mm.**, middle meatus; **U**, uncinate process; **A**, **A**, bony hiatus leading to antrum; **i.m.**, inferior meatus.

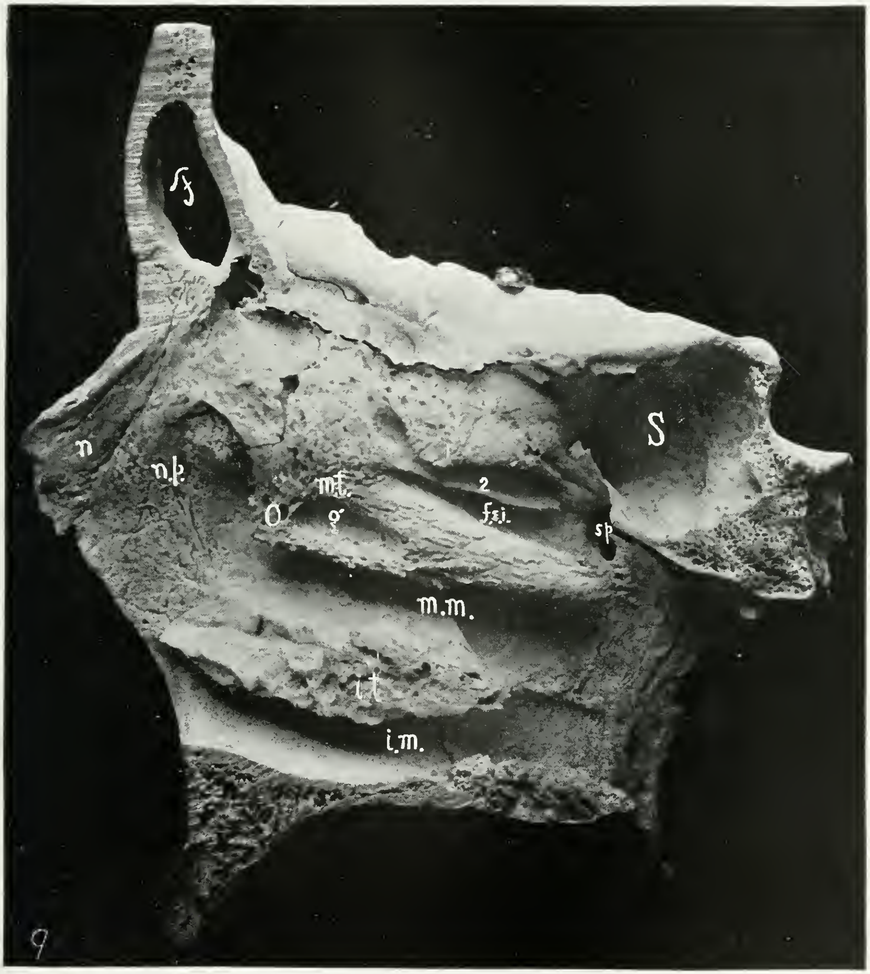

Fig. 9.—Outer bony wall of right nasal fossa; dotted line marks its roof. **F,** frontal sinus; **S,** sphenoidal sinus; **n,** nasal bone; **n.p.**, nasal process of superior maxilla; **s.p.,** sphenopalatine foramen; **m.t.,** middle turbinate; **O,** operculum; **g,** deep groove in middle turbinate; **f.e.i.,** fissura ethmoidalis inferior; 1 and 2, two superior turbinate bones with a deep middle ethmoidal fissure between them; **m.m.,** middle meatus; **i.t.,** inferior turbinate; **i.m.,** inferior meatus.

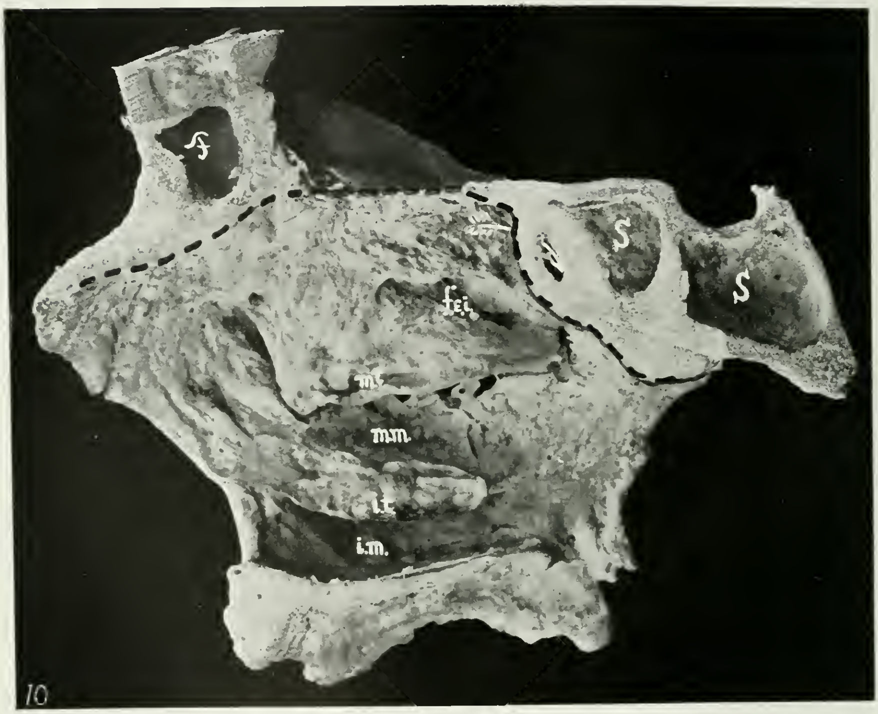

Fig. 10.—Outer bony wall of right nasal fossa; dotted line marks the roof. **F**, frontal sinus; **S**, **S**, sphenoidal sinus, just in front of which an arrow enters a posterior ethmoid cell; **f.e.i.**, fissura ethmoidalis inferior; **m.t.**, middle turbinate; **m.m.**, middle meatus; **i.t.**, inferior turbinate; **i.m.**, inferior meatus.

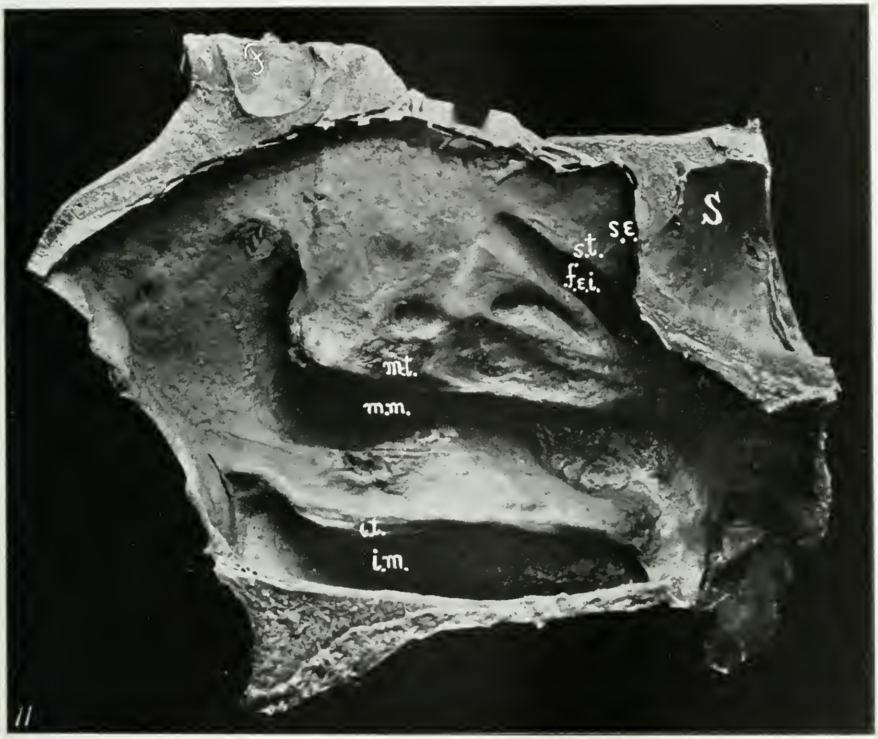

Fig. 11.—Outer bony wall of right nasal fossa; dotted line marks its roof. **S,** sphenoidal sinus; **s.e.,** spheno-ethmoidal recess; **s.t.,** superior turbinate; **f.e.i.,** fissura ethmoidalis inferior; **m.t.,** middle turbinate, showing several depressions. Inferior border measures forty-three millimetres, the anterior border twenty-nine millimetres. **m.m.,** middle meatus; **i.t.,** inferior turbinate; **i.m.,** inferior meatus.

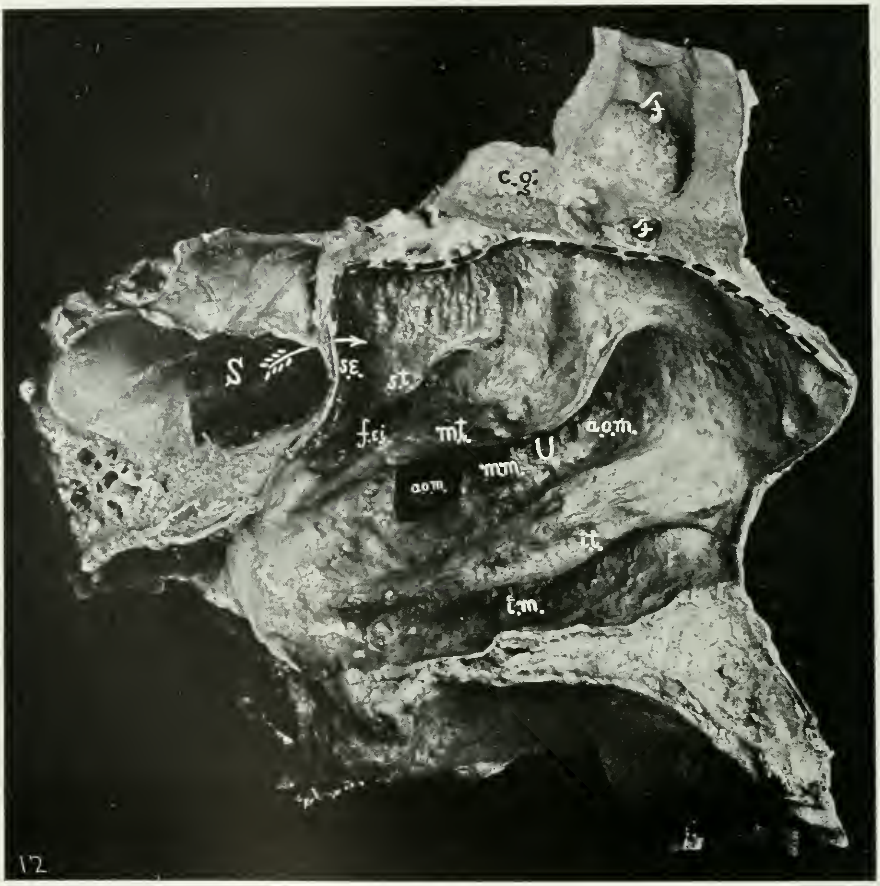

Fig. 12.—Outer wall of left nasal fossa; dotted line marks its roof. **F**, **F**, frontal sinus; **S**, sphenoidal sinus, with arrow entering nasal fossa through the ostium sphenoidale; **s.e.**, spheno-ethmoidal recess; **s.t.**, superior turbinate; **f.e.i.**, fissura ethmoidalis inferior; **m.t.**, middle turbinate. Inferior border measures thirty-eight millimetres, the anterior border, twenty-two millimetres. **m.m.**, middle meatus; **U.** uncinate process; **a.o.m.**, two accessory ostia of the antrum; the normal ostium is just above **m.m.** under cover of the turbinate. Diameter of larger ostium measures eleven millimetres. **i.t.**, inferior turbinate; **i.m.**, inferior meatus; **c.g.**, crista galli on section.

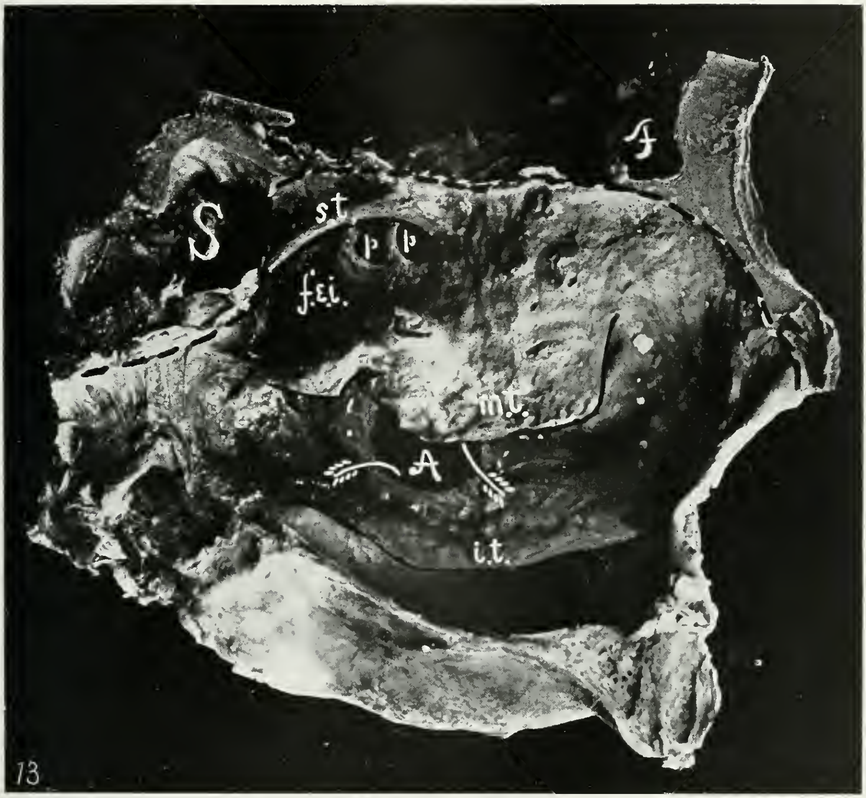

Fig. 13.—Outer wall of left nasal fossa; dotted line marking its roof. **F**, frontal sinus; **S**, sphenoidal sinus; **s.t.**, small atrophic superior turbinate; **p.p.**, ostia of posterior ethmoid cells; **f.e.i.**, wide fissura ethmoidalis inferior; **m.t.**, middle turbinate deeply notched; **i.t.**, inferior turbinate; **A**, very large accessory ostium, through which arrows pass to antrum; its diameter measures twenty millimetres.

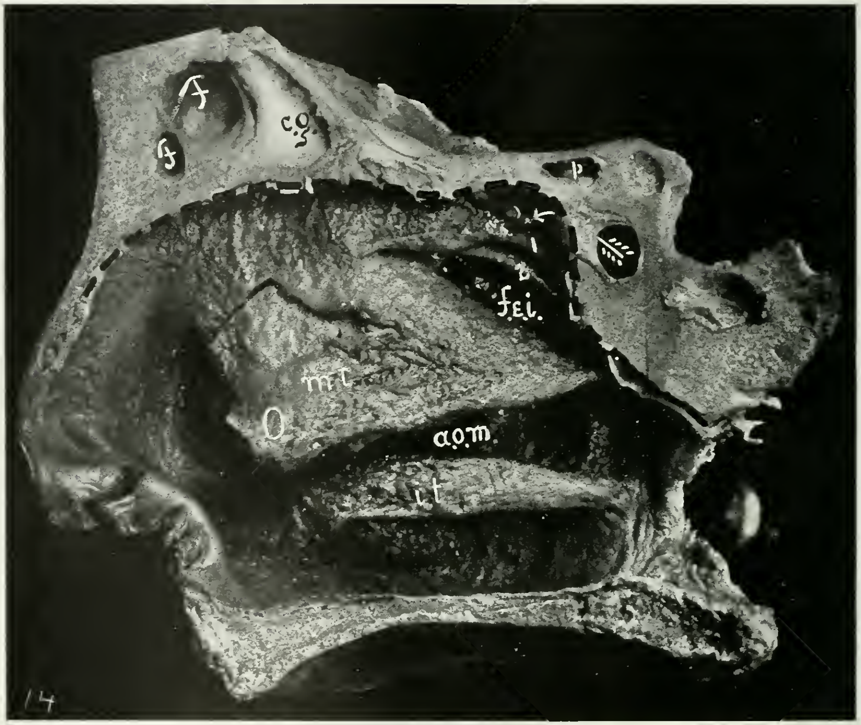

Fig. 14.—Outer wall of right nasal fossa; dotted line marks its roof. **F, F,** frontal sinus; **c.g.,** crista galli, which is hollow and communicates with the frontal sinus; **p,** posterior ethmoid cell. Arrow passes from a sphenoidal sinus through its ostium sphenoidale. **m.t.,** middle turbinate relatively very large. Mucous membrane hypertrophied. Inferior border, fifty millimetres; anterior border, thirty-three millimetres; height of nasal fossa, forty-six millimetres. **O,** operculum prominent; 1 and 2, two superior turbinate bones with a middle ethmoidal fissure between; **f.e.i.,** inferior ethmoidal fissure; **a.o.m.,** accessory ostium maxillare; **i.t.,** inferior turbinate.

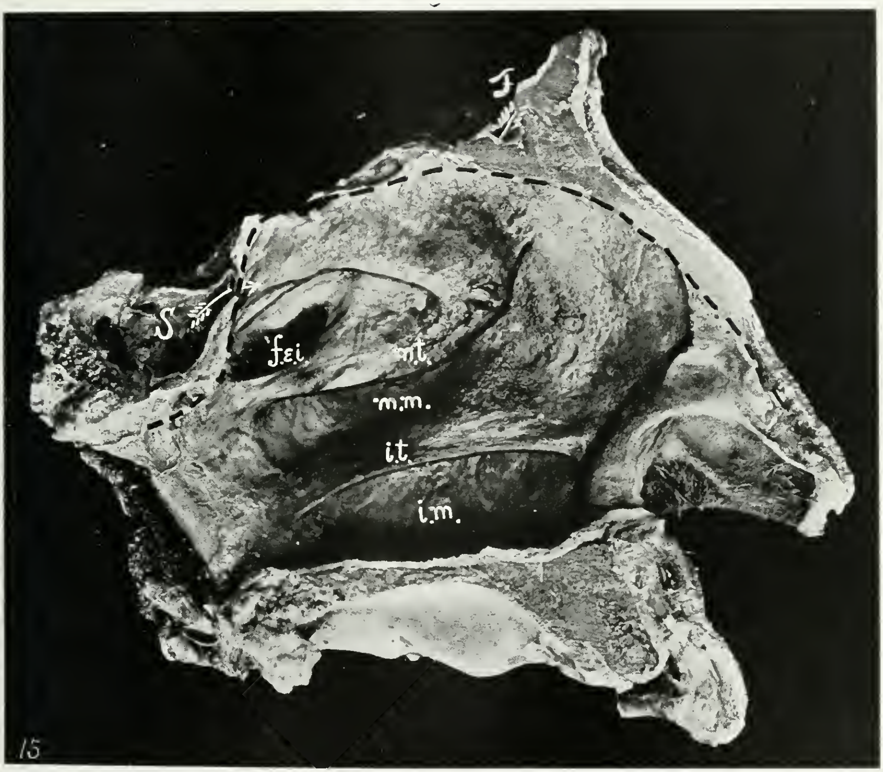

Fig. 15.—External wall of left nasal fossa; dotted line marks its roof. **F**, frontal sinus, with arrow passing towards the ostium frontale; **S**, sphenoidal sinus, with arrow passing through the ostium sphenoidale; **f.e.i.**, opposite a wide ostium of a posterior ethmoid cell. The ethmoidal fissure is high and limited above by a narrow, dark line which marks the border of the atrophied superior turbinate. **m.t.**, middle turbinate, showing the ethmoid fissure running well forward. Inferior border measures forty-eight millimetres, the anterior border, twenty-eight millimetres. **m.m.**, middle meatus; **i.t.**, much atrophied inferior turbinate; **i.m.**, inferior meatus.

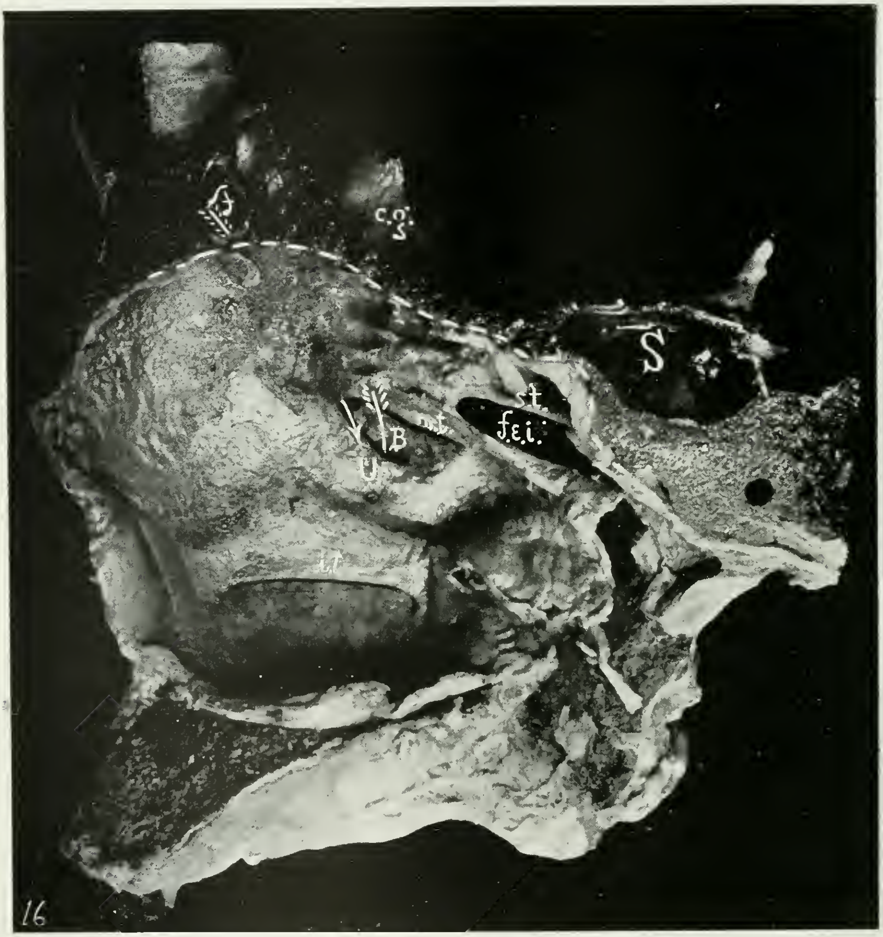

Fig. 16.—Outer wall of right nasal fossa; dotted line marks its roof. Specimen shows a most extreme degree of atrophy. **F**, frontal sinus, with arrow which reappears after passing through the ostium frontale under the middle turbinate; **m.t.**, a very short atrophied middle turbinate which consists chiefly of a membraneous fold measuring five millimetres long; **B**, ethmoid bulla, below which an arrow passes through the ostium maxillare into a small antrum; **U**, uncinate process; **s.t.**, atrophied superior turbinate; **f.e.i.**, fissura ethmoidalis inferior; **i.t.**, inferior turbinate, much atrophied.

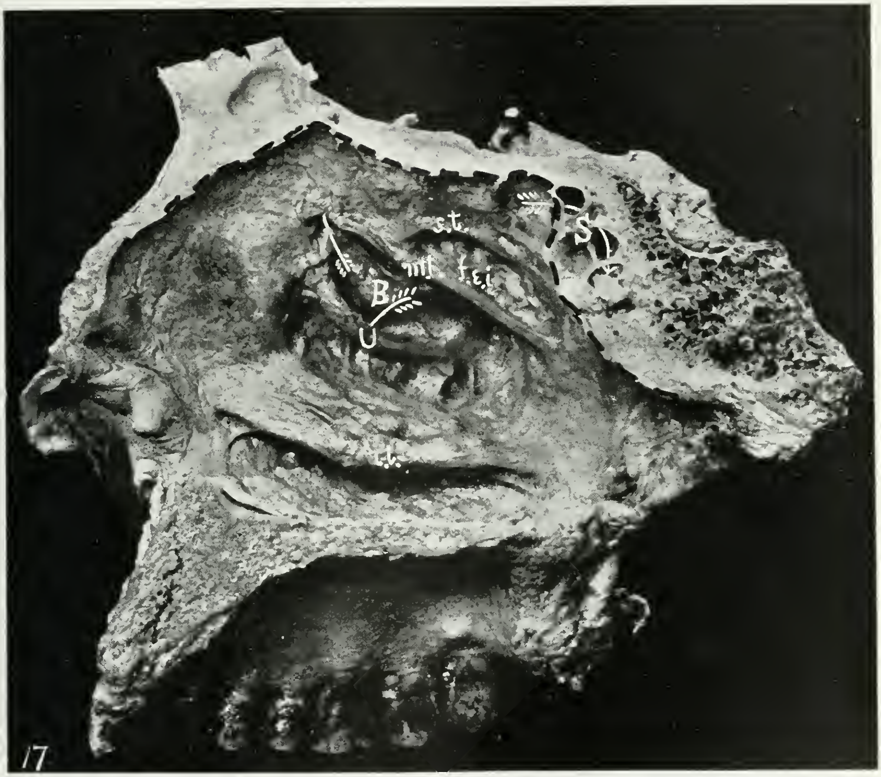

Fig. 17.—Outer wall of right nasal fossa showing an extreme degree of atrophy; dotted line marks roof of fossa. **S,** sphenoidal sinus, small and subdivided by cellular partitions. Arrow enters sinus through the ostium sphenoidale; **s.t.,** much atrophied superior turbinate; **f.e.i.,** fissura ethmoidalis inferior; **m.t.,** extreme atrophy of middle turbinate which consists chiefly of a fold of membrane without bone tissue; **B,** ethmoid bulla, above which is its ostium; anteriorly is an arrow leading to the frontal sinus; **U,** uncinate process, behind which an arrow passes through the ostium maxillare to a very small antrum; **i.t.,** inferior turbinate.

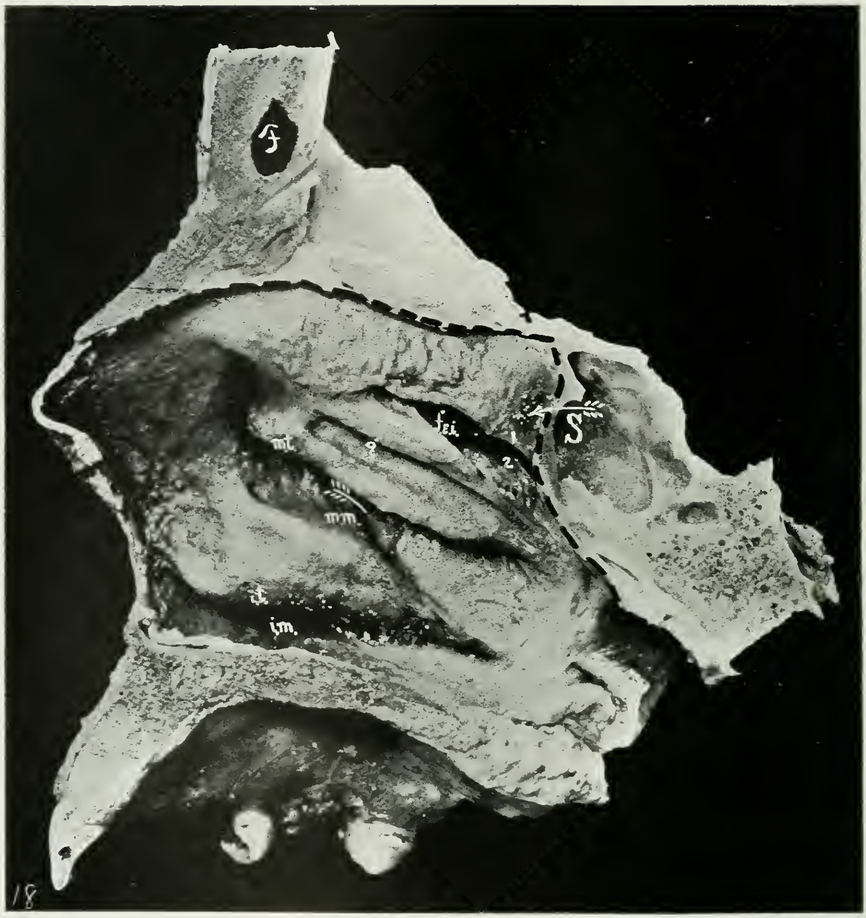

Fig. 18.—Outer wall of right nasal fossa; dotted line marks the roof. **F,** frontal sinus; **S,** sphenoidal sinus, with arrow pointing through the ostium sphenoidale; 1 and 2, two small superior turbinates; **f.e.i.,** fissura ethmoidalis inferior; **m.t.,** middle turbinate, on the inner aspect of which is a deep groove (**g**) thirty-six millimetres long and five millimetres high and deep; **m.m.,** middle meatus, with arrow passing through the ostium maxillare to antrum; **i.t.,** inferior turbinate; **i.m.,** inferior meatus.

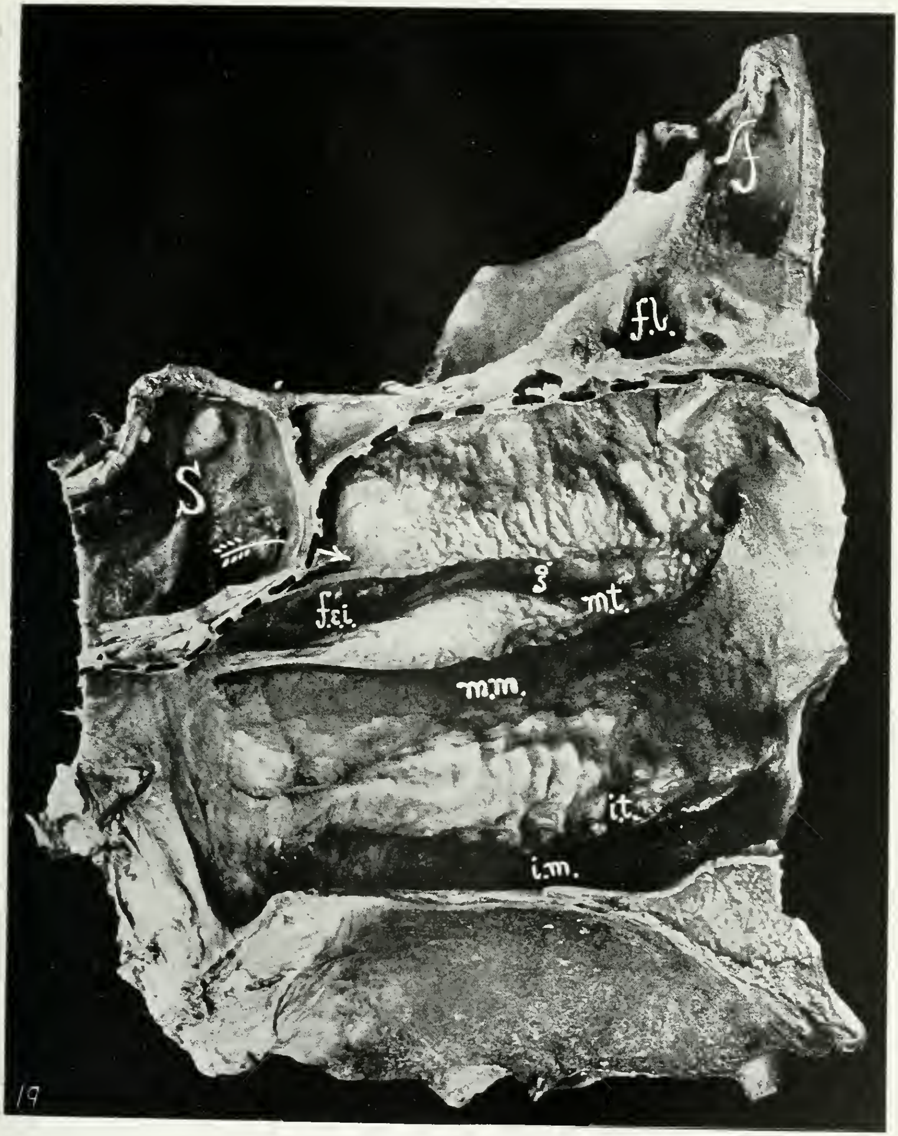

Fig. 19.—Outer wall of left nasal fossa; dotted line marks the roof. **F**, frontal sinus; **f.b.**, an anterior ethmoid cell making a frontal bulla; **S**, sphenoidal sinus, arrow passing through the ostium sphenoidale; **f.e.i.**, fissura ethmoidalis inferior, which extends forward as a deep groove (**g**) on the inner surface of middle turbinate (**m.t.**). Inferior border of the turbinate measures forty-eight millimetres, the anterior border, twenty millimetres. **m.m.**, middle meatus; **i.t.**, inferior turbinate; **i.m.**, inferior meatus.

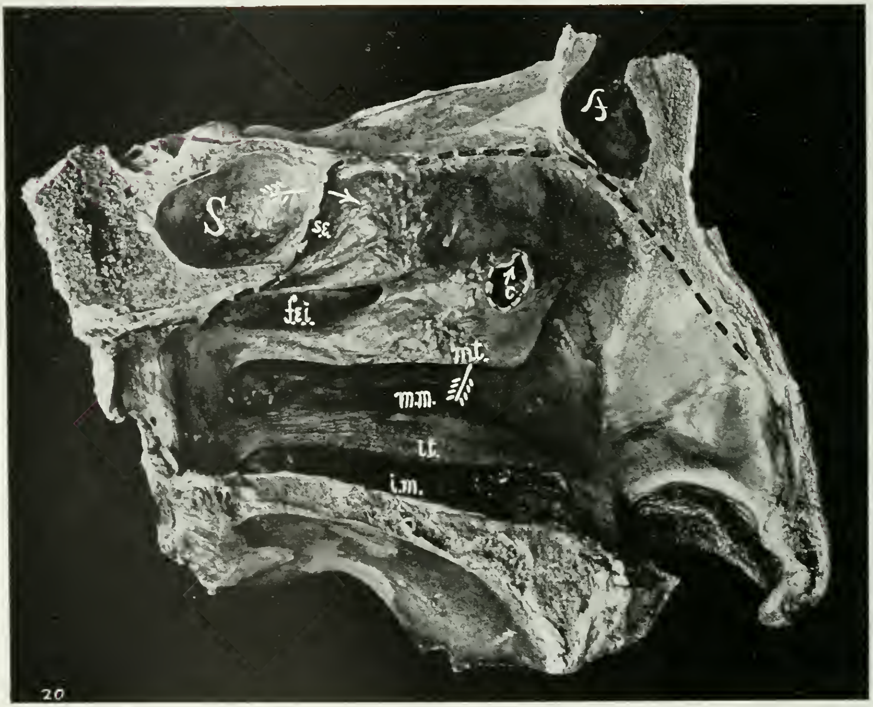

Fig. 20.—Outer wall of left nasal fossa; dotted line marks its roof. **F**, frontal sinus; **S**, sphenoidal sinus, with arrow passing through the ostium sphenoidale; **s.e.**, spheno-ethmoidal recess; **f.e.i.**, fissura ethmoidalis inferior; **m.t.**, middle turbinate, containing a cell (**c**) showing an arrow entering its ostium from the middle meatus; **m.m.**, middle meatus; **i.t.**, inferior turbinate; **i.m.**, inferior meatus.

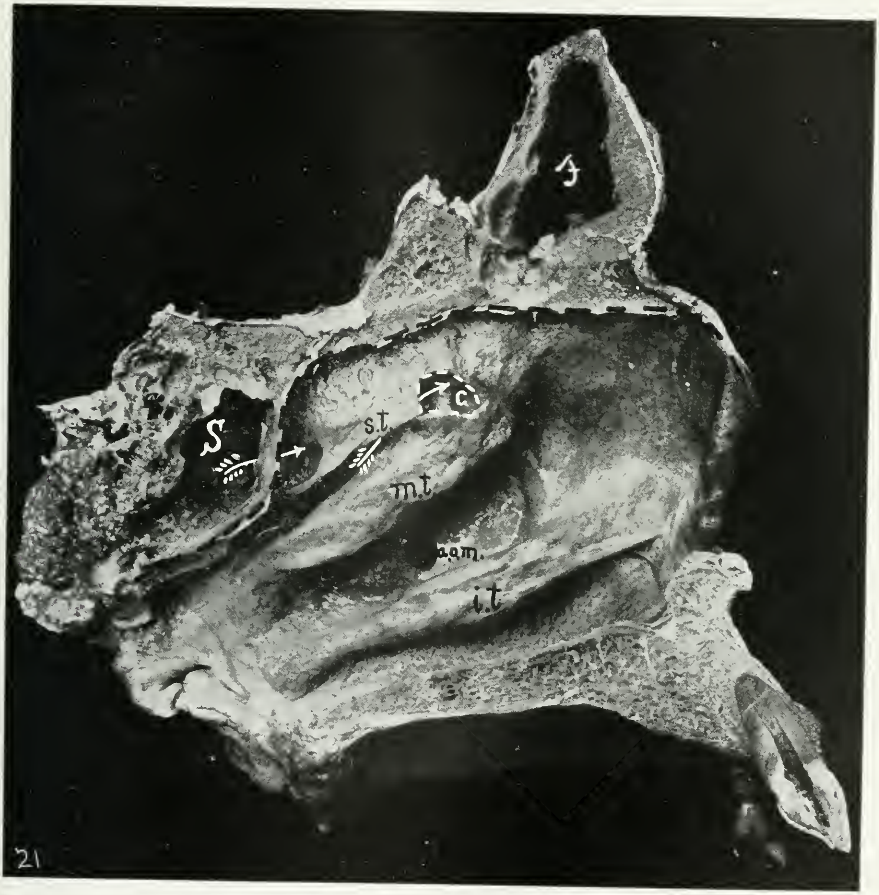

Fig. 21—Outer wall of left nasal fossa; dotted line marks its roof. **F**, frontal sinus; **S**, sphenoidal sinus, with arrow through its ostium; **s.t.**, superior turbinate; **m.t.**, middle turbinate; **c**, cell in middle turbinate, with arrow entering its ostium from the inferior ethmoidal fissure; **a.o.m.**, accessory ostium maxillare; **i.t.**, inferior turbinate.

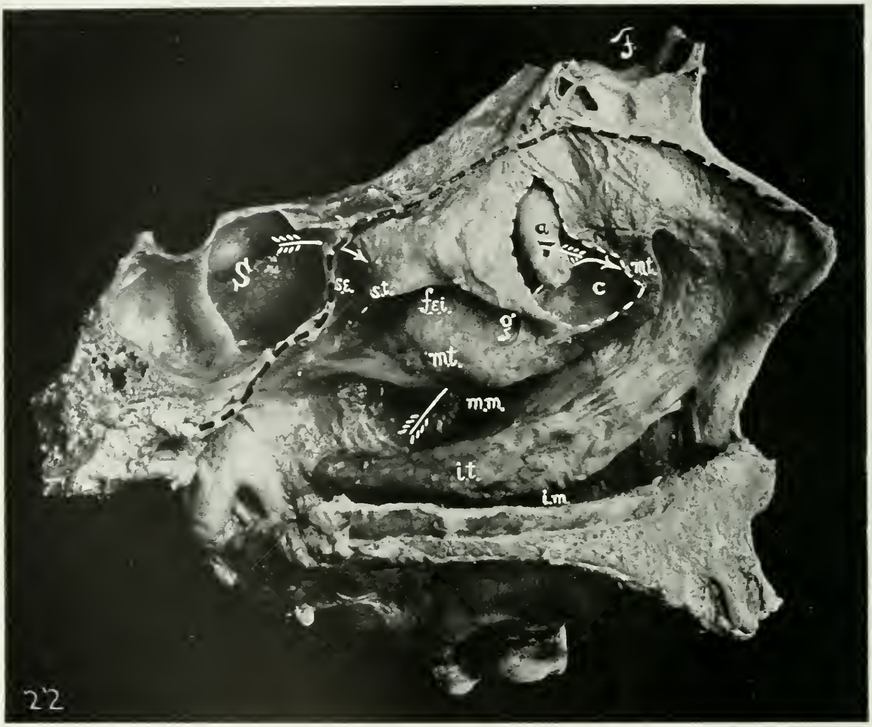

Fig. 22.—Outer wall of left nasal fossa; dotted line marks its roof. **F**, frontal sinus; **S**, sphenoidal sinus, arrow passes through its ostium; **s.e.**, spheno-ethmoidal recess; **s.t.**, superior turbinate; **f.e.i.**, inferior ethmoidal fissure prolonged as a groove (**g**) on the middle turbinate (**m.t.**); **m.m.**, middle meatus, with arrow passing into a large cell in the middle turbinate bone (**c**). The inner wall of this cell has been removed, exposing a swelling (**a**) which passes into this cell. This swelling is an unusually formed anterior ethmoid cell, into which an arrow is made to pass; it is fifteen millimetres long. The middle turbinate cell measures fifteen millimetres long, twenty-five millimetres high, and twelve millimetres wide. Inferior border of turbinate measures fifty-five millimetres, and the anterior border, thirty millimetres. **i.t.**, inferior turbinate; **i.m.**, inferior meatus.

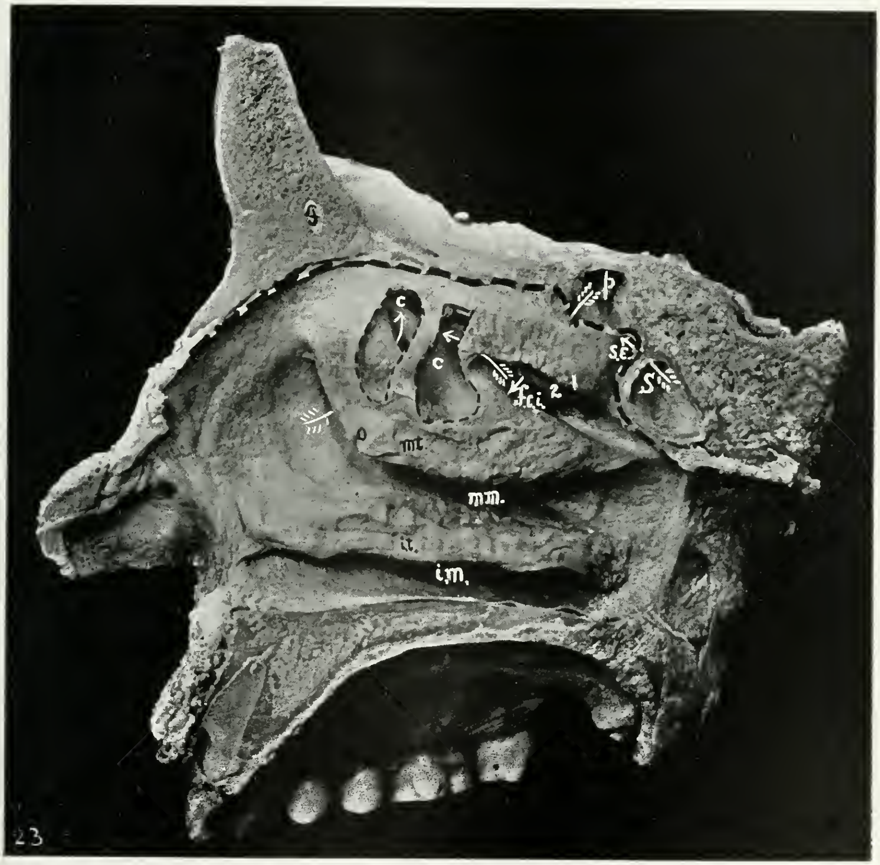

Fig. 23.—Outer wall of right nasal fossa; dotted line marks its roof; double cells in the turbinate. **F**, frontal sinus, membrane just exposed without opening the sinus; **S**, small sphenoidal sinus, with arrow through its ostium; **s.e.**, spheno-ethmoidal recess; **p**, posterior ethmoidal cell, with arrow passing through its ostium into the inferior ethmoidal fissure (**f.e.i.**); 1 and 2, two superior turbinate bones; **m.t.**, middle turbinate with operculum (**O**). Inferior border, forty-five millimetres; anterior border, twenty-eight millimetres. **c.c.**, two cells in middle turbinate with inner wall removed. The anterior one opens into the middle meatus as shown by arrow; the posterior one opens into the ethmoidal fissure above the middle turbinate, and also communicates with the posterior ethmoid cells which extend to the roof of the fossa. The anterior cell is seven millimetres long, seventeen millimetres high, and five millimetres wide; the posterior cell is ten millimetres long, nineteen millimetres high, and six millimetres wide. **i.t.**, inferior turbinate; **i.m.**, inferior meatus.

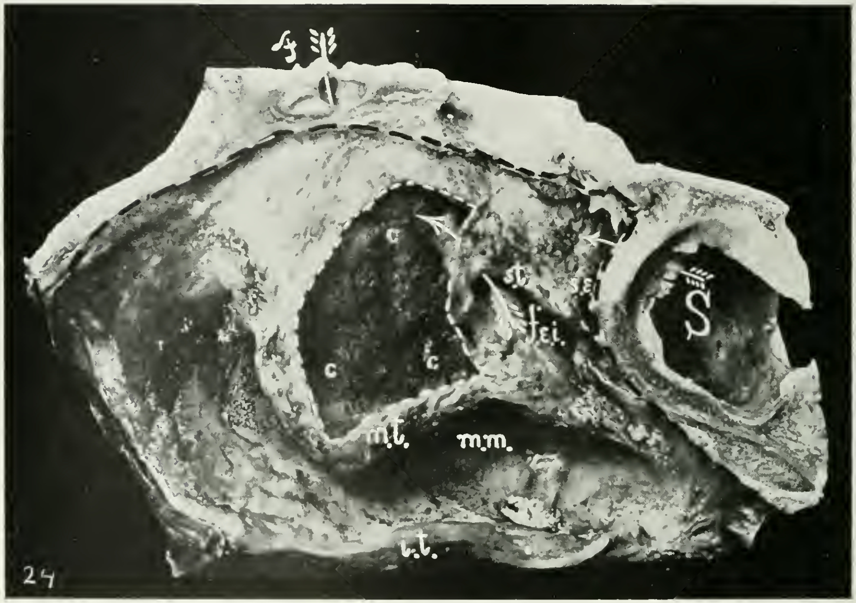

Fig. 24.—Outer wall of right nasal fossa exposing a very large hollow, middle turbinate. The inner wall removed, exposing its cavity (**c, c**), into which an arrow passes through its ostium from the inferior ethmoidal fissure (**f.e.i.**). This cell measures twenty-five millimetres long, thirty-one millimetres high, and fourteen millimetres wide. The height of the turbinate is thirty-five millimetres. **F**, frontal sinus, with arrow passing to middle meatus (**m.m.**); **s.t.**, superior turbinate; **S**, sphenoidal sinus, with arrow passing through its ostium; **s.e.**, spheno-ethmoidal recess; **i.t.**, inferior turbinate.

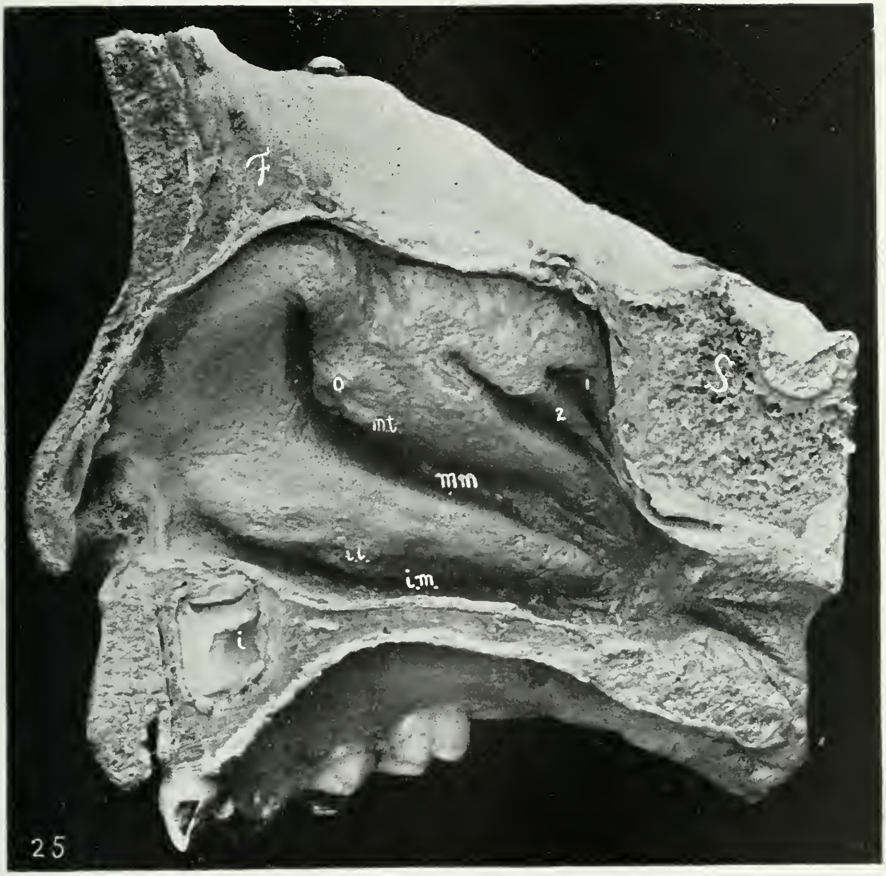

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Fig. 25.—Outer wall of right nasal fossa; child, five years of age. **F**, small frontal sinus; **S**, spongy tissue in body of sphenoid bone corresponding to site of sphenoidal sinus; 1 and 2, two superior turbinate bones; **m.t.**, middle turbinate with its operculum (**O**). Inferior border measures thirty millimetres; anterior border, sixteen millimetres. **m.m.**, middle meatus; **i.t.**, inferior turbinate; **i.m.**, inferior meatus; **i**, incisor tooth of permanent set prior to eruption.

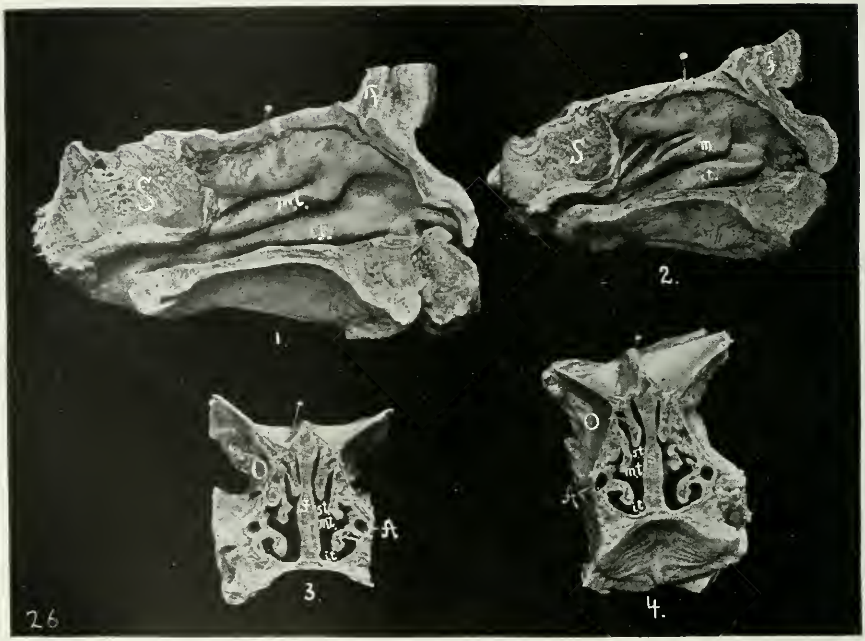

Fig. 26.—Nasal fossa of infant at birth; mucous membrane smooth and comparatively thick.

Nos. 1 and 2, outer wall of left fossa. **F**, cancellated tissue at site of undeveloped frontal sinus; **S**, site of undeveloped sphenoidal sinus; **m.t.**, middle turbinate; **i.t.**, inferior turbinate.

Nos. 3 and 4, transverse sections showing turbinates and meatuses. **O**, orbital fossa; **s.n.**, septum nasi; **s.t.**, superior turbinate; **m.t.**, middle turbinate; **i.t.**, inferior turbinate; **A**, antrum.

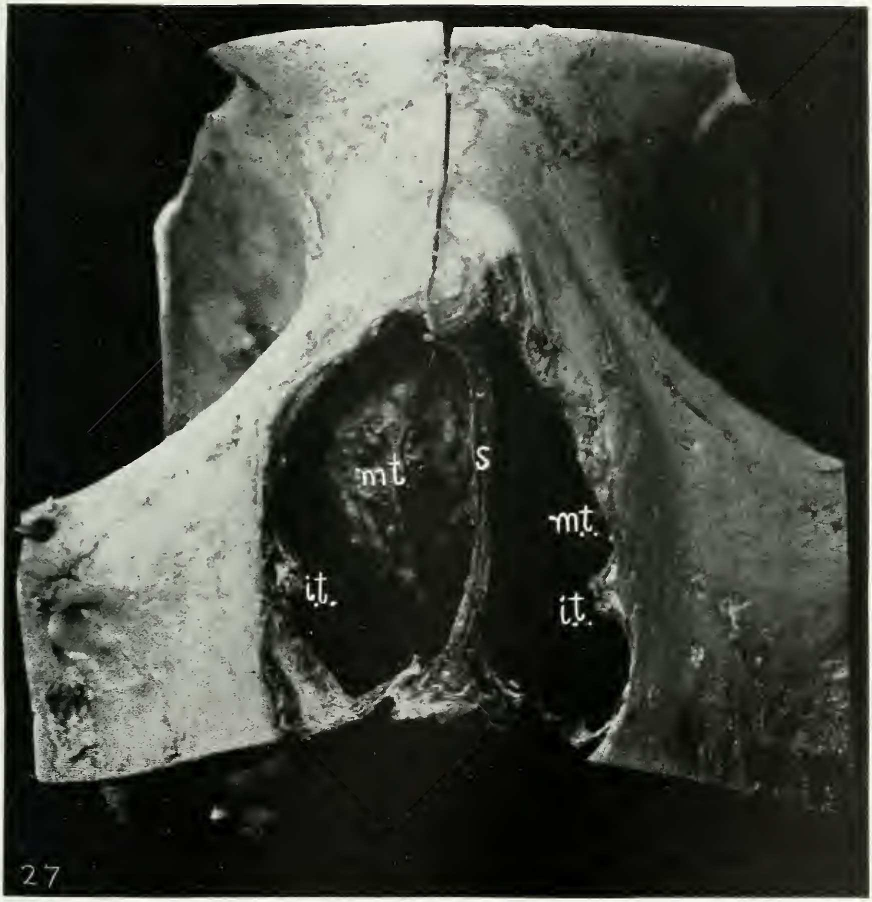

Fig. 27.—Front view of anterior nares, showing a slight deviation of the septum (**s**) to the left in consequence of a large cellular middle turbinate (**m.t.**). This turbinate occluded the right nasal fossa except for a narrow space along the floor, and contains the largest cell observed in all the specimens examined compared with the size of the fossa. The very large size of the turbinates is due to the presence of very thick walls and of a large cell. **i.t.,** inferior turbinate. See Figs. 28 and 29.

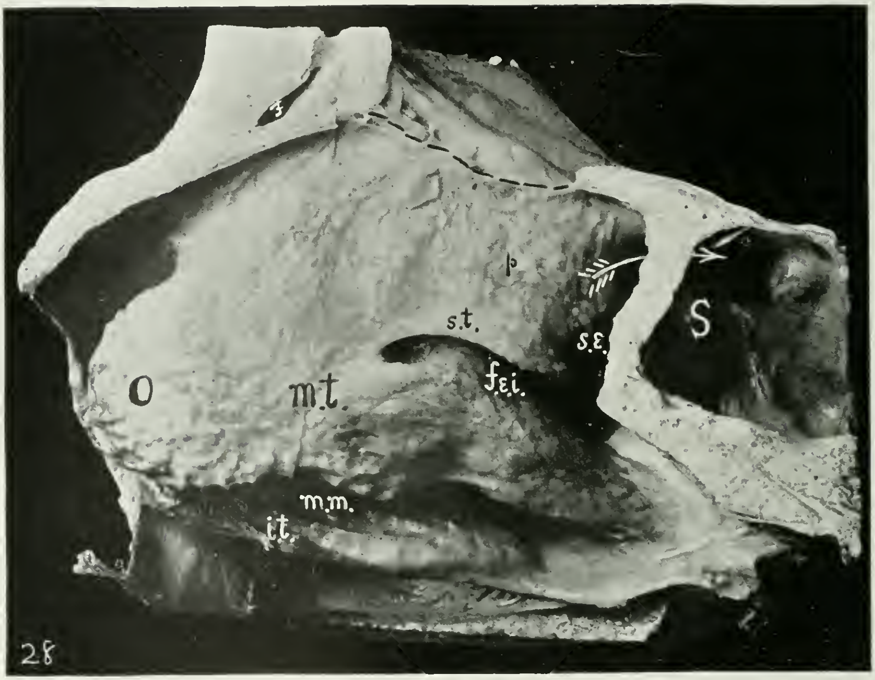

Fig. 28.—Outer wall of right nasal fossa; specimen shown in Figs. 27 and 29. **m.t.**, lateral view of a very large middle turbinate. A faint vertical line through the **m** shows where this specimen is divided for Fig. 29. A large cell with thick walls which opens into the middle meatus occupies the anterior two-thirds of the turbinate. It measures twenty-eight millimetres long, seventeen millimetres high, and twelve millimetres wide. The turbinate is large and bold; its inferior border measures sixty-five millimetres, its anterior border forty-five millimetres. **O**, prominent operculum; **F**, frontal sinus; **S**, sphenoidal sinus, with arrow entering through the ostium sphenoidale; **s.e.**, spheno-ethmoidal recess; **p**, is placed on the inner wall of a posterior ethmoid cell; **s.t.**, superior turbinate; **f.e.i**, fissura ethmoidalis inferior; **m.m.**, middle meatus; **i.t.**, inferior turbinate.

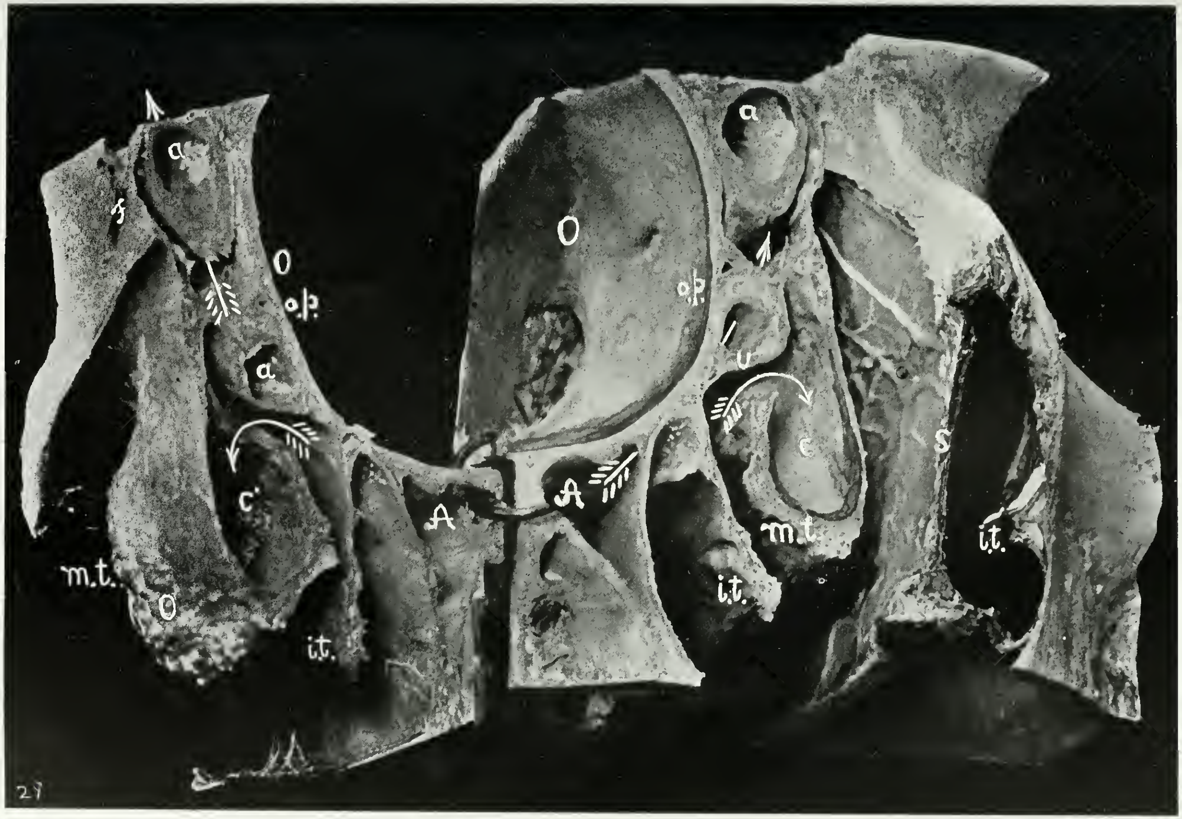

Fig. 29.—Transverse section of right lateral half of specimen shown in Figs. 27 and 28 just anterior to the ostium maxillare; the anterior half is rotated outward so as to expose both cut edges, left nasal fossa is intact. **O, O,** orbital fossa; **m.t.,** middle turbinate, anterior and posterior portions; **c, c,** coresponding halves of the large cell contained within the turbinate. An arrow marks its ostium into the middle meatus. It is so situated that its holding capacity for fluids with the head erect is considerable; **O,** operculum; **F,** frontal sinus, near which is an arrow entering the sinus just anterior to an anterior ethmoidal cell (**a**) which forms a frontal bulla. The posterior half shows the remaining part of this cell. **o.p.,** os planum of ethmoid bone; **A, A,** comparatively small antrum, with an arrow passing out of its ostium directly towards the frontal sinus; **U,** uncinate process, above which is a cell space carried forward and marked **a** in the anterior half and known as the infundibulum. **i.t.,** inferior turbinate; **s,** nasal septum, showing injected arteries.

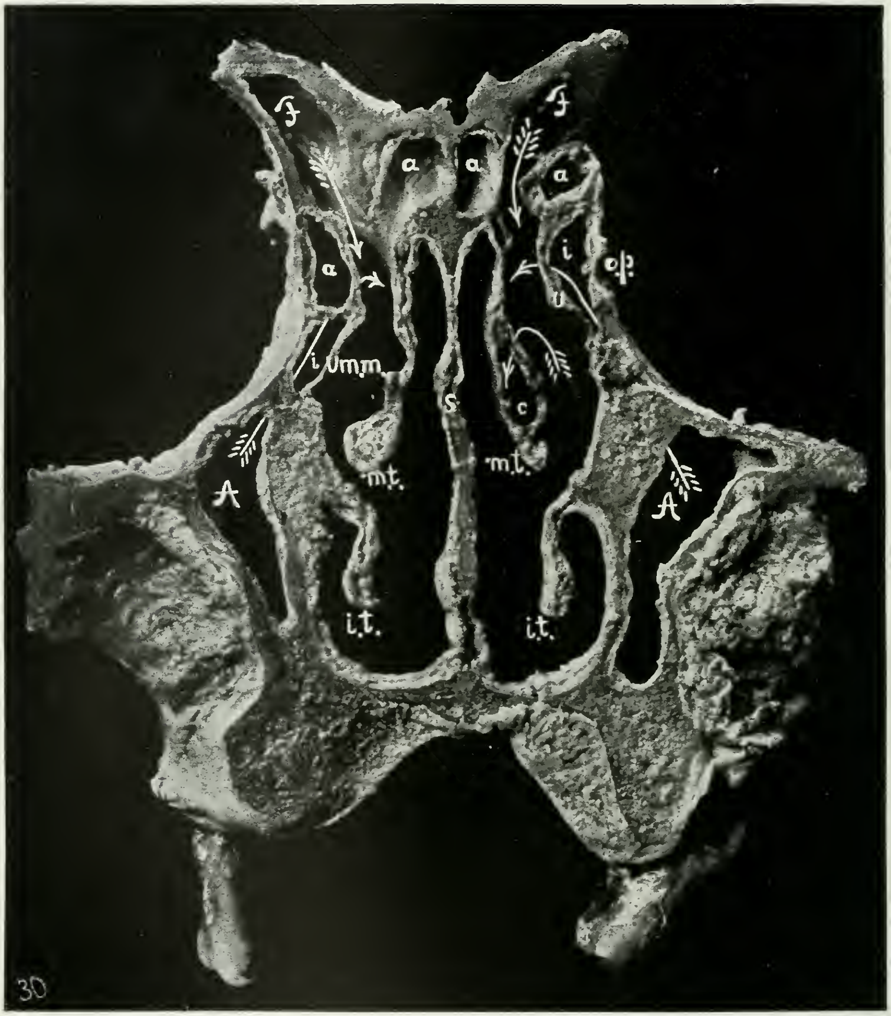

Fig. 30.—Transverse section just anterior to the ostium maxillare. **F**, frontal sinuses, with arrows passing through their ostia directly into the middle meatus without entering the infundibulum (**i**); **a**, **a**, anterior ethmoid cells; **A**, antrum. Arrows pass into the infundibulum (**i**) through the ostium maxillare, thence through the hiatus semilunaris into the middle meatus under the middle turbinate bone. **U**, uncinate process, which is placed obliquely and forms the internal wall of the infundibulum; **s**, septum nasi; **m.t.**, middle turbinate. On the left side this turbinate contains a cell (**c**) which communicates with the middle meatus, as shown by an arrow. **i.t.**, inferior turbinate; **o.p.**, os planum.

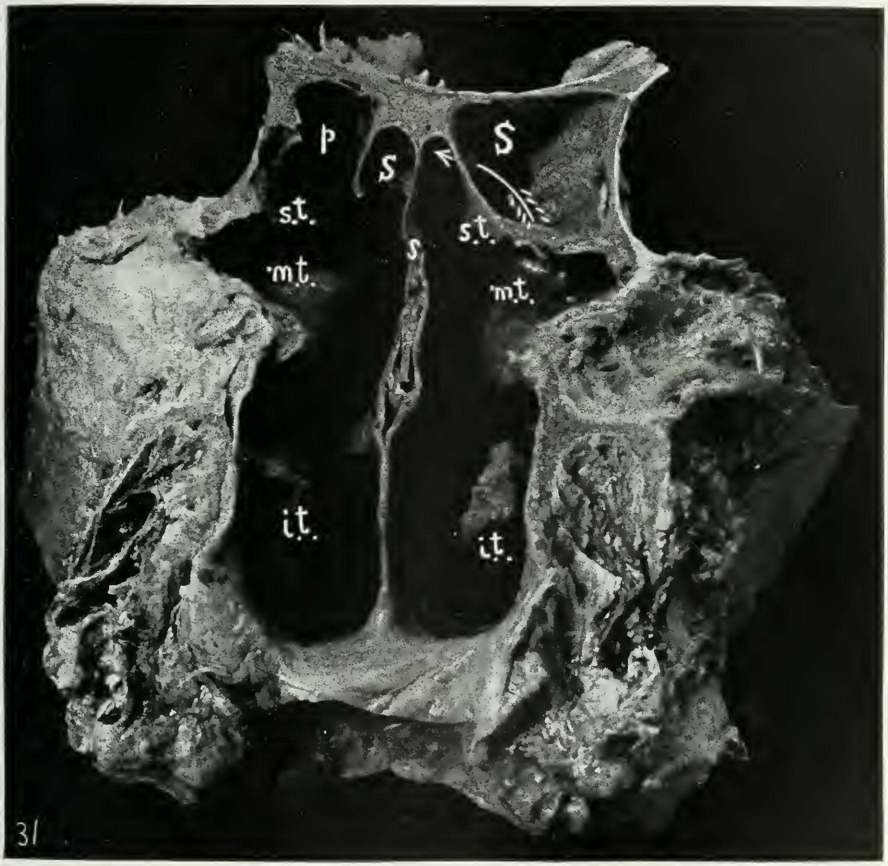

Fig. 31.—Transverse section at the posterior extremity of the middle turbinate bones. The section shows the horizontal aspect of the posterior half of the turbinate (**m.t.**). **S**, right sphenoidal sinus, with arrow passing through its ostium into the nasal fossa. Only a small portion of the left sinus appears, and to the left is a large posterior ethmoidal cell (**p**). **s.t.**, superior turbinate; **s**, septum nasi; **i.t.**, inferior turbinate.

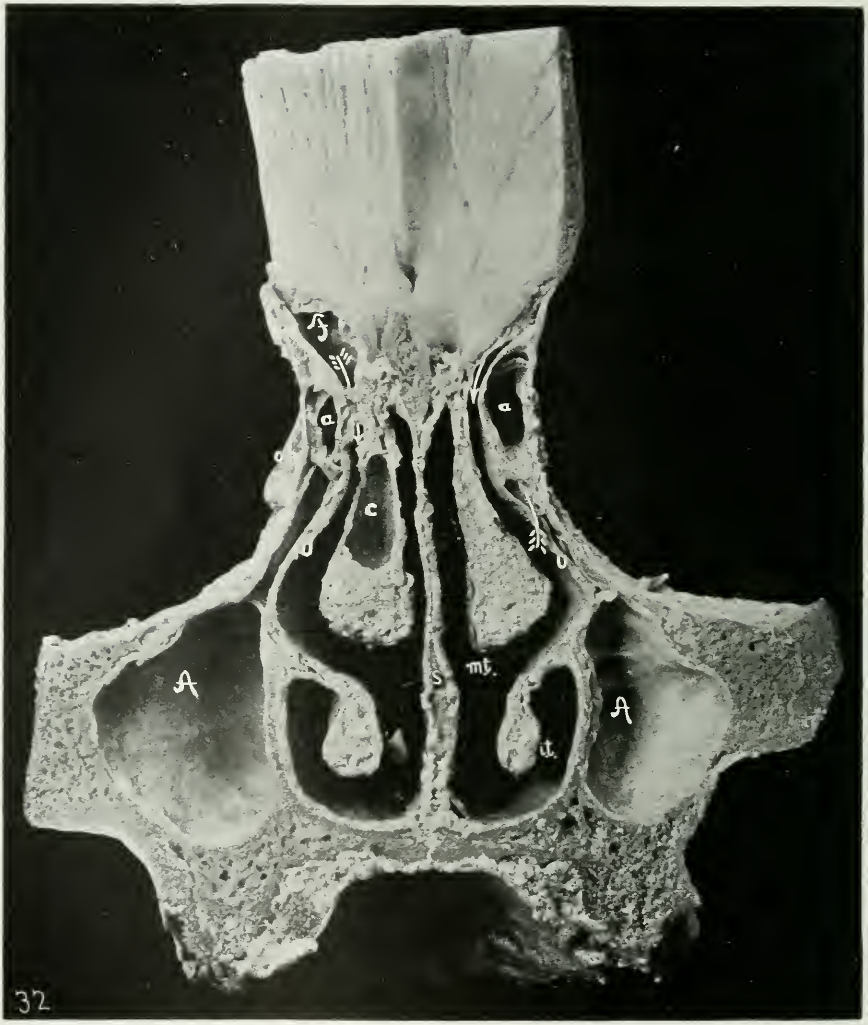

Fig. 32.—Transverse section at the ostium maxillare. (See Fig. 33.) **F,** left frontal sinus, with arrow passing through its ostium into the turbinate fossa. A similar arrow emerges from the right sinus. **o.p.,** os planum; **a. a,** anterior ethmoid cells; **m.t.,** middle turbinate bodies. unique in that they consist of very dense bone tissue measuring ten millimetres in width. They contain a cell (**c**) which is larger in the left turbinate, but the cell in the right turbinate is located so far posteriorly as to appear in the posterior half (Fig. 33). **U,** uncinate process. On the right side an arrow passes forward in the infundibulum which ends blindly in a cell; **s,** septum nasi;**i.t.,** inferior turbinate; **A,** antrum.

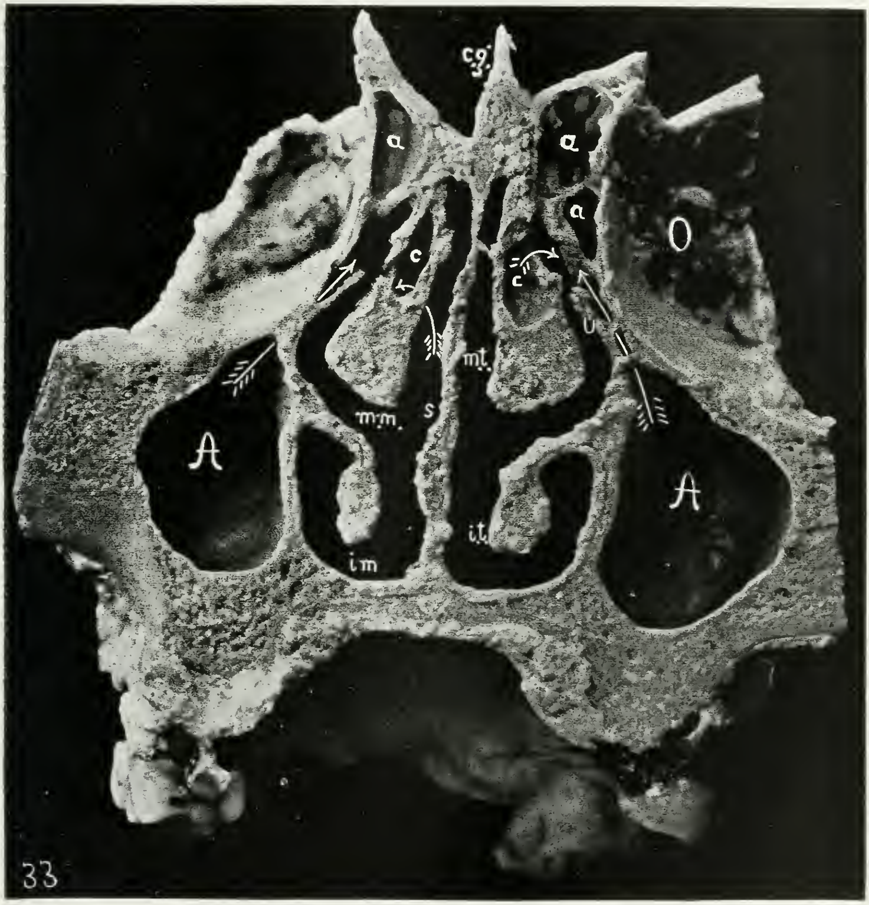

Fig. 33.—Posterior half of specimen shown in Fig. 32. **m.t.**, middle turbinate bodies characterized by much dense bone tissue, above which is a cell (**c**). The cell in the right turbinate opens into the inferior ethmoid fissure as shown by the arrow, that in the left turbinate opens into the middle meatus; **c.g.**, crista galli; **a.** anterior ethmoid cells; **O**, orbital fossa; **m.m.**, middle meatus; **s**, septum nasi; **i.t.**, inferior turbinate; **i.m.**, inferior meatus; **A**, antrum. Arrows pass through the ostium maxillare into the infundibulum and terminate at the hiatus semilunaris. **U**, uncinate process.

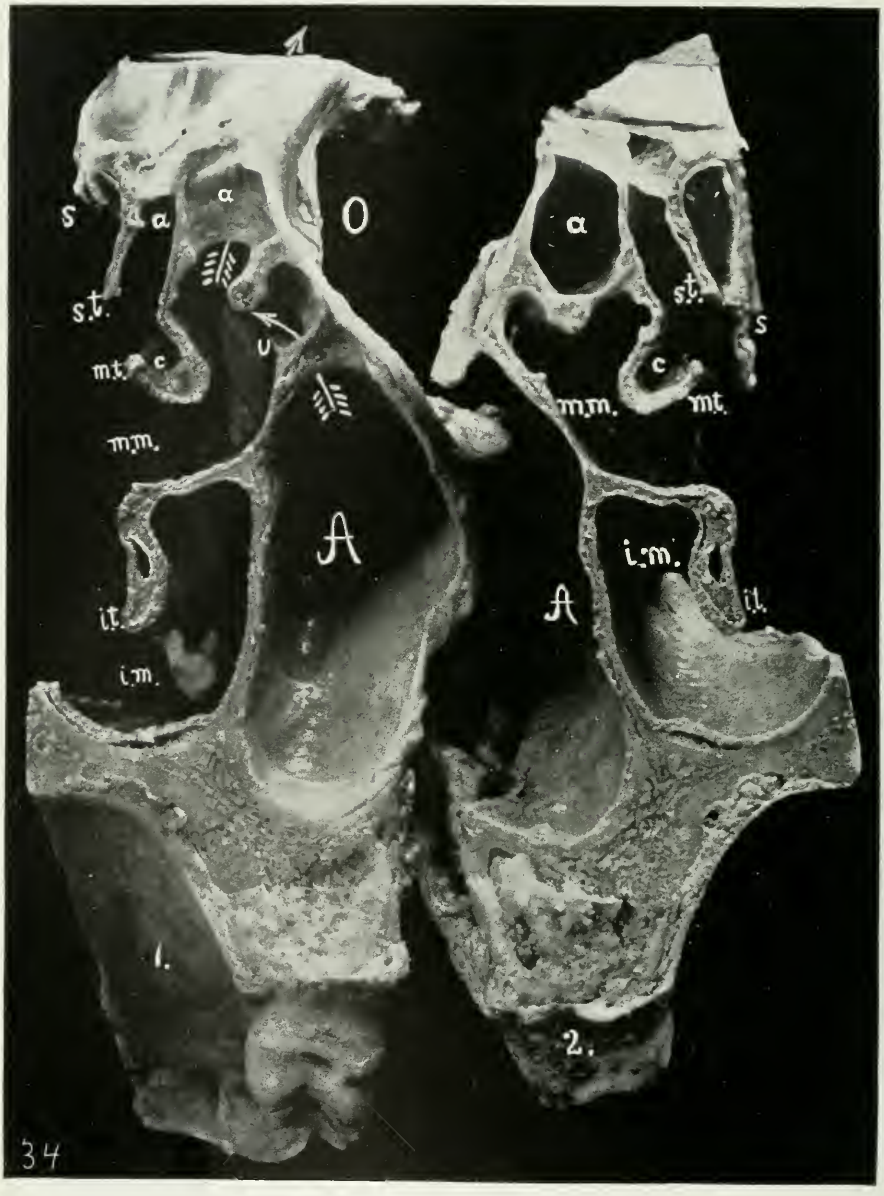

Fig. 34.—Transverse section of right nasal fossa. septum (**s**) fragmentary. The two halves of this specimen are placed side by side. 1, anterior half; 2, posterior half; **s**, septum nasi; **s. t.**, superior turbinate; **a**, anterior ethmoid cells. In 1 an arrow passes forward from the turbinate fossa into the frontal sinus, and a second arrow from the antrum (**A**) into the infundibulum; the antrum is large. **O**, orbital fossa; **m.t.**, middle turbinate in this specimen is unique in that it presents a deep concavity (**c**) on its internal surface; **m.m.**, middle meatus; **i.t.**, inferior turbinate; **i.m.**, inferior meatus.

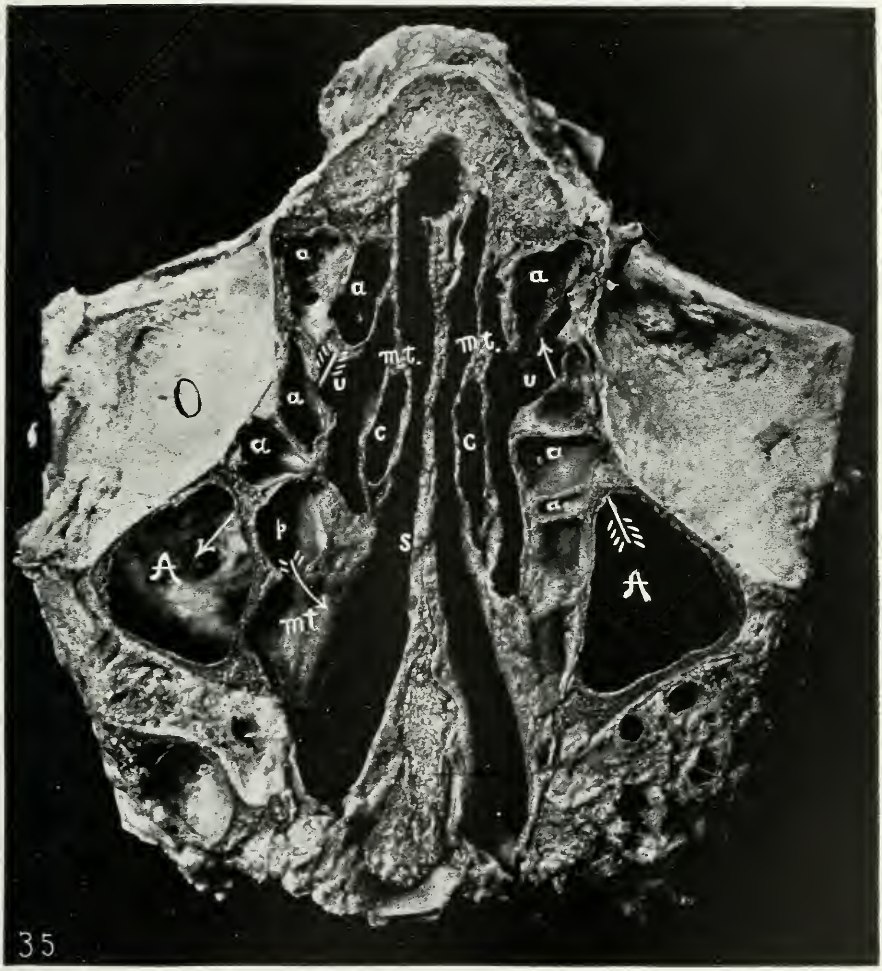

Fig. 35.—Horizontal section above the level of the ostium maxillare, lower half of specimen shown in Fig. 36. **A**, antrum, with arrows indicating the position of the ostium maxillare and lying in the infundibulum; **U**, uncinate process; the cavity just external to the letter is the infundibulum; **a**, **a**, anterior ethmoid cells; **p**, posterior ethmoid cells; **s**, septum nasi; **O**, orbital fossa; **m.t.**, middle turbinates. The posterior half of each turbinate is horizontal; the anterior half is vertical, and in each instance the turbinate contains a cell (**c**). The ostium of these cells is shown in Fig. 36. The dark space external to these turbinates is the middle meatus, and the long, dark area internal to the turbinates divided by the septum is the general cavity of the nasal fossa.

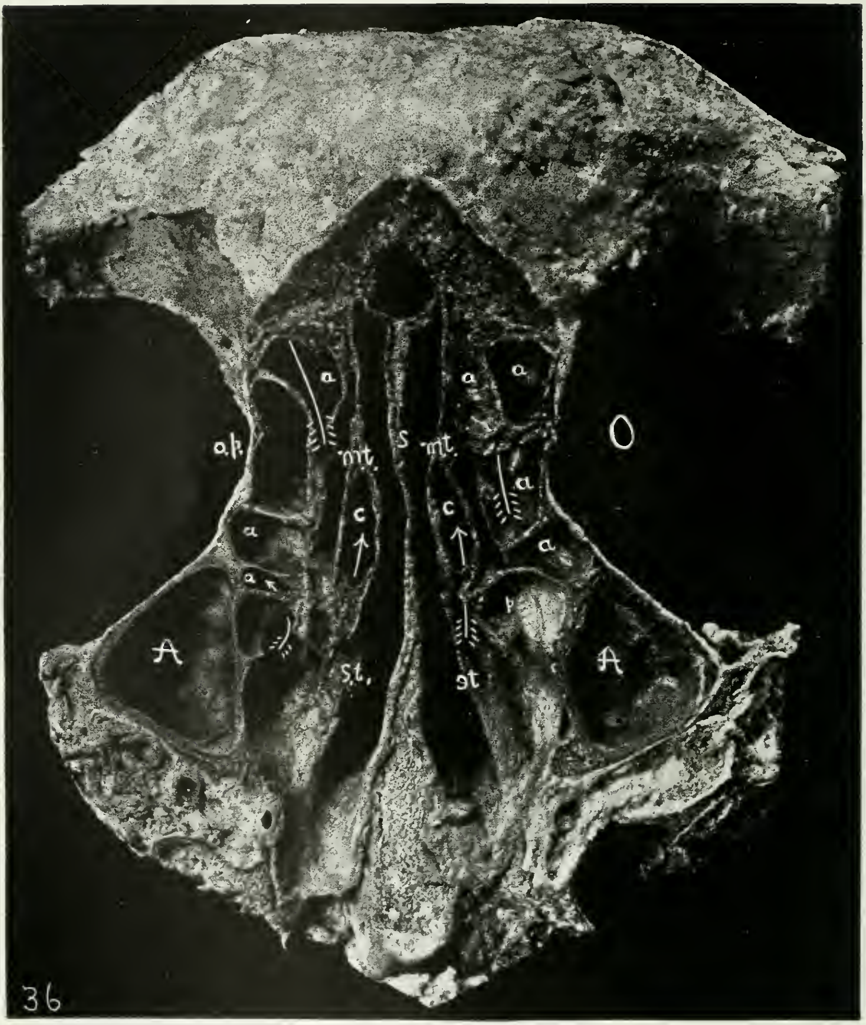

Fig. 36.—Horizontal section; upper half of specimen shown in Fig. 35. **A**, superior wall of antrum; **O**, orbital fossa; **s**, septum nasi, dividing the general nasal fossae shown as long, dark areas; **o.p.**, os planum of ethmoid; **a, a**, anterior ethmoid cells; **p.** posterior ethmoid cell. Two arrows are seen running forward into the frontal sinuses. **s.t.**, superior turbinates showing their under surface, which bounds above the recess called fissura ethmoidalis inferior; **m.t.**, the anterior vertical half of the middle turbinates containing the upper half of a cell. Arrows show these cells opening into the inferior ethmoidal fissure.

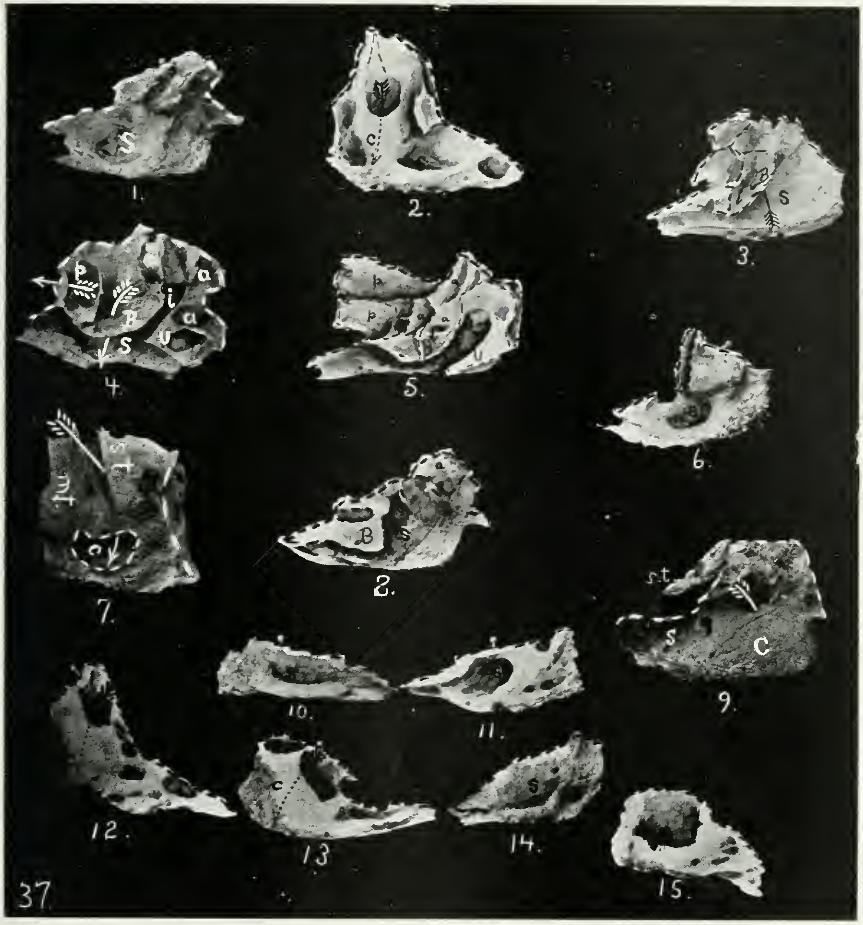

Fig. 37.—Lateral views of bony middle turbinate bodies removed along their line of attachment (dotted line) to the general mass of the ethmoid bone. **S**, sinus turbinalis, which is always on external surface; **a**, anterior and, **p**, posterior ethmoid cells; **c**, cell in the turbinate; dotted lines mark the cavities of ethmoid cells.

1. External surface of a right turbinate.
2. External surface of a left turbinate; arrow enters the ostium of a cell which opens into the middle meatus.
3. External surface of right turbinate; arrow enters the ostium of the ethmoid bulla (**B**).
4. External surface of right turbinate; arrow passes through the ostium of the ethmoid bulla (**B**) into middle meatus. **I**, infundibulum; **U**, uncinate process.
5. External surface of right turbinate. **B**, bulla with arrow through its ostium; **U**, uncinate process.
6. External surface of right turbinate. Operculum contains a cell, behind which is a deep sinus turbinalis.
7. Internal surface of left turbinate; arrow passes through inferior ethmoid fissure into a large cell (**c**), the wall of which has been partly removed; **s.t.**, superior and **m.t.**, middle turbinate bones. Cell measures sixteen millimetres long, twenty millimetres high, and eight millimetres wide.
8. External surface of right turbinate showing bulla and sinus.
9. External surface of right turbinate, which contains a very large cell with thin walls; it occluded the fossa; arrow shows its ostium; cell measures thirty millimetres long, twenty-two millimetres high, and eleven millimetres wide.
10. External surface of left turbinate showing a normal sinus.
11. External surface of right turbinate with a small cell anteriorly and a comparatively deep sinus.
12. Left turbinate external surface. Whole anterior half contains a large cell, into which an arrow is directed. It opens into the middle meatus. It measures sixteen millimetres long, twenty-two millimetres high, and twelve millimetres wide.
13. External surface of a middle turbinate, which contains a large cell occupying the anterior two-thirds of the turbinate. It measures eighteen millimetres long, sixteen millimetres high, and eight millimetres wide.
14. Outer wall of a right turbinate with a normal sinus.
15. Outer wall of a left turbinate which contains a deep sinus.

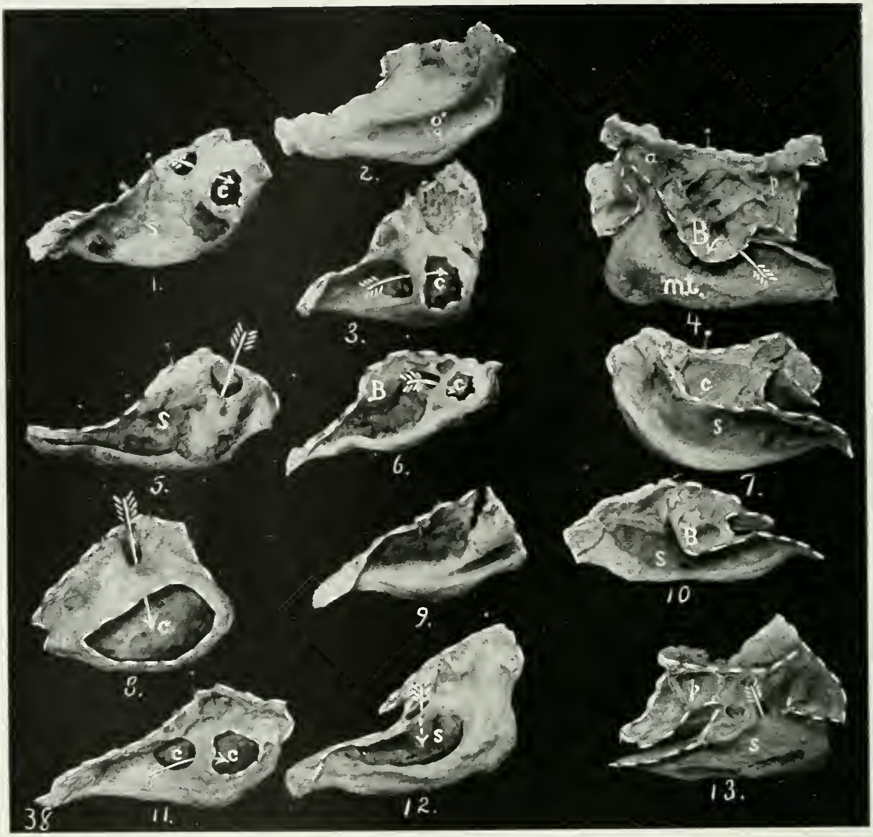

Fig. 38.—Lateral view of middle turbinates still covered with mucous membrane. A dotted line along the upper border shows the line of attachment to the lateral mass of the ethmoid bone. The cavity of cells (**c**) has been exposed by removing a portion of the lateral wall. **s**, sinus turbinalis. Portions of the superior turbinate appear in Nos. 4, 7, 10 and 13.

1. External wall of right turbinate; arrow passes into a cell through its ostium from the middle meatus.
2. Internal surface of left turbinate marked by a deep groove (**g**).
3. External surface of right turbinate; arrow passes through a large ostium into a cell which occupies the anterior half of the turbinate.
4. External wall of left turbinate. **a** and **p** represent the broken ethmoid cells; **B**, ethmoid bulla, with arrow entering the cavity through its ostium.
5. External wall of right turbinate showing a cell which occupies the anterior half of the turbinate opening into the middle meatus.
6. External wall of right turbinate which contains a cell occupying the anterior third of the turbinate.
7. External wall of left turbinate, the middle third of which contains a cell.
8. External wall of right turbinate containing a cell which occupies the greater part of the turbinate. It opens into the middle meatus It measures twenty-nine millimetres long, nineteen millimetres high, and ten millimetres wide.
9. Internal wall of left turbinate.
10. External wall of left turbinate. **B**, bulla.
11. External wall of right turbinate containing a cell in anterior third. The **c** to the left is at the ostium of the cell.
12. External wall of right turbinate. The arrow shows a cell placed vertically in the middle third of the turbinate. The turbinate sinus is deep.
13. External wall of right turbinate; arrow enters a large cell in anterior half of turbinate.

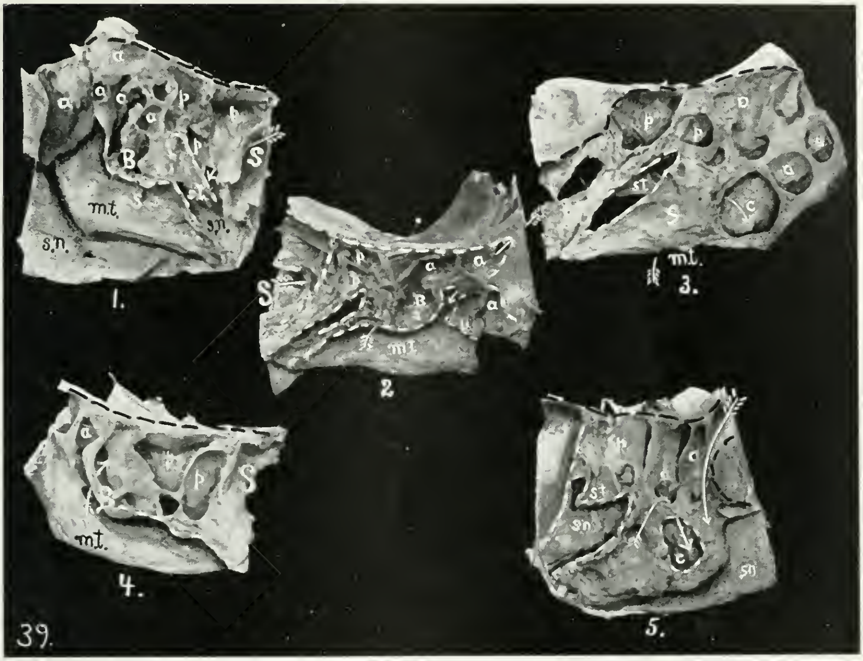

Fig. 39.—A series of middle turbinates removed by a vertical section through ethmoid cells, showing broken cells and the external surface of the turbinate. **a**, and **p**, anterior and posterior ethmoid cells; **m.t.**, middle turbinate; **s.t.**, superior turbinate.

1. **S**, anterior wall of sphenoidal sinus with arrow passing into spheno-ethmoidal recess through the ostium sphenoidale; **s.t.**, superior turbinate; **m,t.**, middle turbinate; **s.n.**, septum nasi; **B**, bulla.

2. **S**, sphenoidal sinus with arrow through its ostium; **B**, bulla with arrow entering its cavity from the middle meatus; **U**, uncinate process broken off. To the right is an arrow which leads from the frontal sinus, showing that the sinus communicates directly with the turbinate fossa.

3. The section passes vertically through a cell in the turbinate, into which an arrow passes from the inferior ethmoid fissure.

4. Free margin of the turbinate is thick. **B**, bulla with its cavity subdivided by bony partitions.

5. **S**, sphenoidal sinus; **s.n.**, septum nasi. A large cell occupies the anterior half of the turbinate opening into the middle meatus. Its ostium is at the apex of the cell. An arrow shows the communication with the frontal sinus.

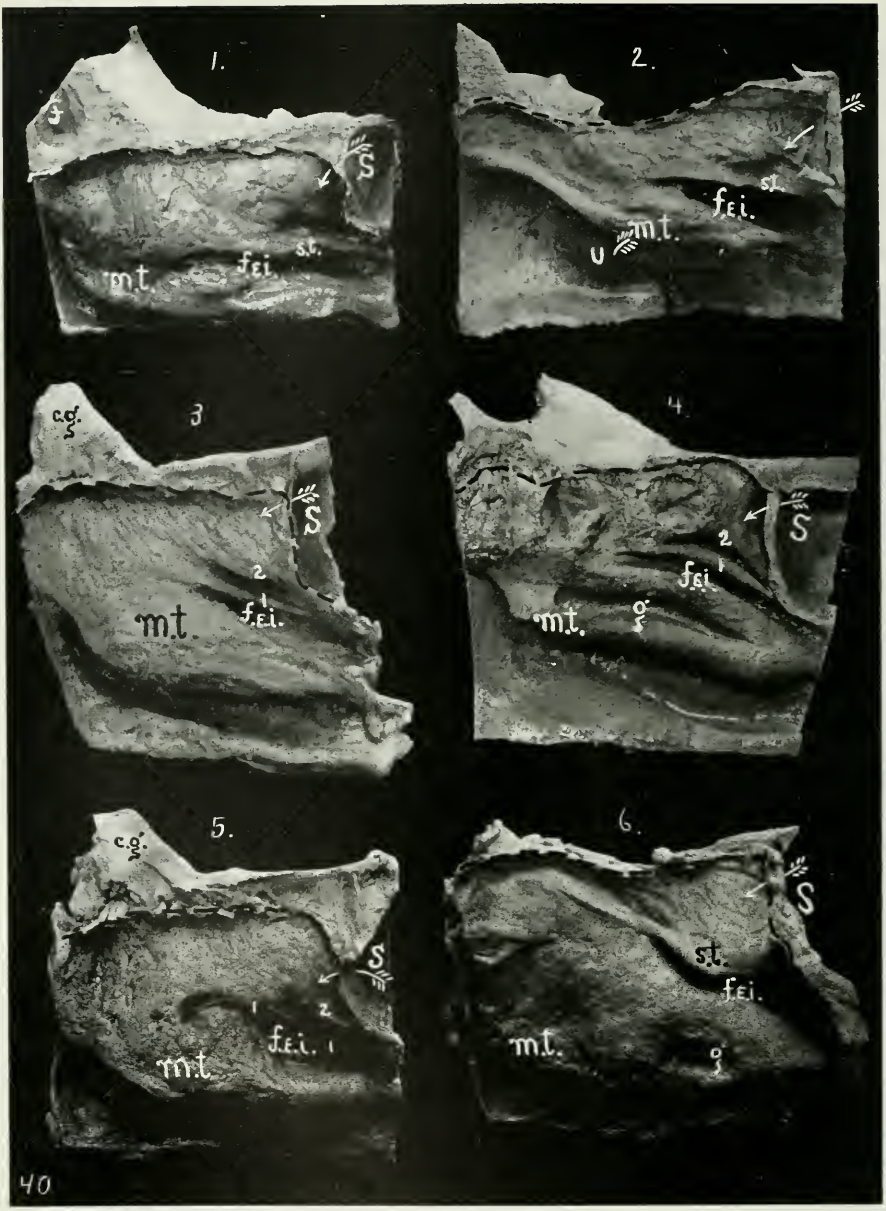

Fig. 40.—Internal surfaces of a series of middle turbinate bones; dotted line marks the roof of nasal fossa. **S**, sphenoidal sinus with arrow through ostium sphenoidale; **m.t.**, middle turbinate; **s.t.**, superior turbinate; **f.e.i.**, fissura ethmoidalis inferior; **c.g.**, crista galli.

1. Average turbinate.
2. Small turbinate with anterior and inferior borders forming a very obtuse angle. **U**, uncinate process, behind which an arrow passes into the antrum through the ostium maxillare.
3. Average turbinate. 1 and 2, two superior turbinate bodies, between which is an ethmoidal fissure.
4. Small turbinate, on the wall of which is a large, deep groove. 1 and 2, two superior turbinate bodies.
5. Average turbinate. 1 and 2, two superior turbinate bodies.
6. Average turbinate with a short groove (**g**).

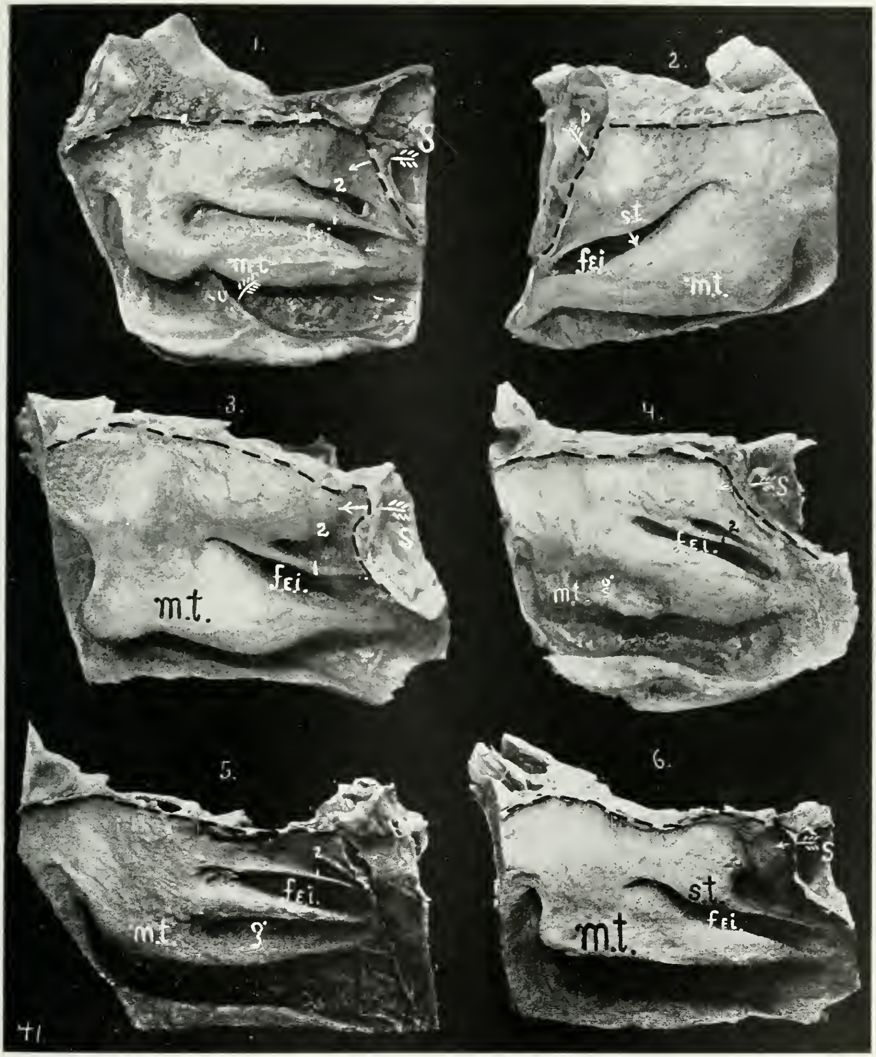

Fig. 41.—Internal surface of a series of middle turbinate bones; dotted line marks the roof of nasal fossa. **S**, sphenoidal sinus, with arrow through ostium; **m.t.**, middle turbinate; **s.t.**, superior turbinate; 1 and 2, two superior turbinates; **f.e.i.**, fissura ethmoidalis inferior.

1. Notch on lower border of turbinate; deep middle ethmoid fissure showing ostium of a posterior ethmoid cell. **U**, uncinate process, behind which an arrow passes to antrum.

2. Average turbinate; arrow passes through a large posterior ethmoid cell.

3. Borders of turbinate make an acute angle forming a well-marked operculum.

4. Groove (**g**) on internal surface of an average turbinate.

5. Borders of turbinate form an obtuse angle; long deep groove on turbinate; lower and middle ethmoid fissures well marked.

6. Average specimen. **s.t.**, well-marked cell in a superior turbinate.

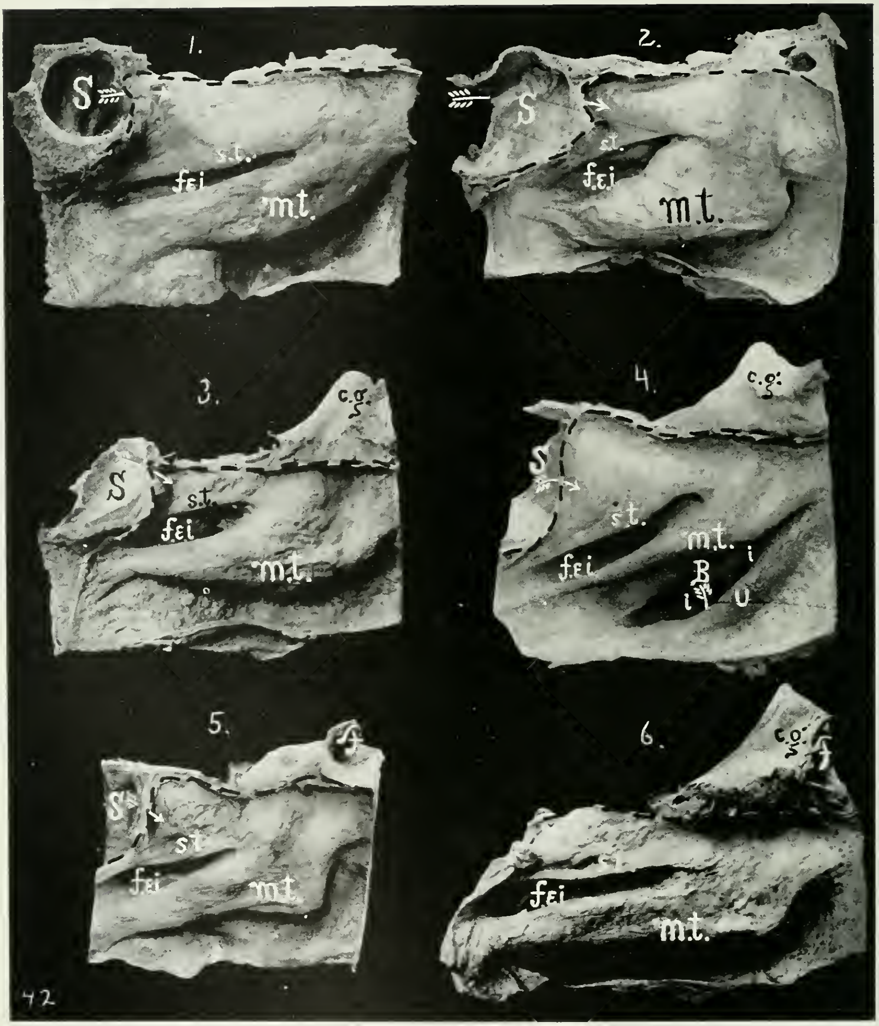

Fig. 42.—Internal surface of a series of left turbinates; dotted line marks roof of nasal fossa. **S**, sphenoidal sinus, with arrow through its ostium; **s.t.**, superior turbinate; **m.t.**, middle turbinate; **f.e.i.**, fissura ethmoidalis inferior; **F**, frontal sinus; **c.g.**, crista galli.

1. Small turbinate with obtuse angle.
2. Average specimen.
3. Small turbinate.
4. Turbinate much atrophied; it should cover the structures below it. **B**, bulla ethmoidalis; **i**, infundibulum; **U**, uncinate process, with arrow passing behind into the antrum.
5. Average specimen.
6. A long narrow turbinate.

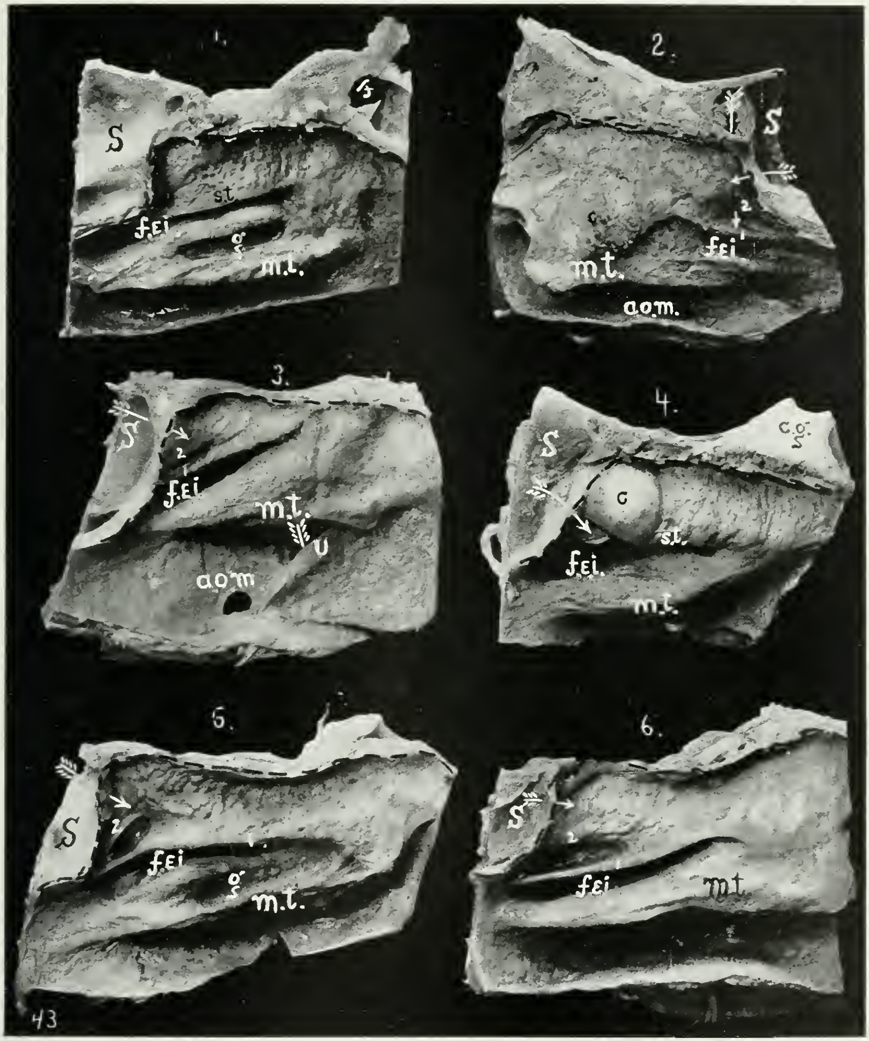

Fig. 43.—Internal surface of a series of turbinates; dotted line marks roof of fossa. **S**, sphenoidal sinus, with arrow through its ostium; **s.t.**, superior turbinate; **m.t.**, middle turbinate; **f.e.i.**, inferior ethmoidal fissure; **F**,frontal sinus; **c.g.**, crista galli.

1. Turbinate presents a deep groove (**g**).

2. Prominent operculum. 1 and 2, two superior turbinates, between which an arrow emerges through an ostium of a posterior ethhmoid cell into the middle turbinate fissure; **a.o.m.**, accessory ostium maxillare

3. Small turbinate. Two superior turbinates. **a.o.m.**, accessory ostium maxillare; **U**, uncinate process, with arrow passing into the antrum through the usual ostium maxillare.

4. Borders of turbinate meet at a very obtuse angle. **c.g.**, crista galli; **c**, prominent posterior cell in the superior turbinate called the "tuberculum ethmoidale posticum."

5. Long, narrow turbinate with deep groove (**g**). Two superior turbinates with inferior ethmoid fissure carried well forward.

6. Borders of turbinate form a right angle. Two superior turbinates.

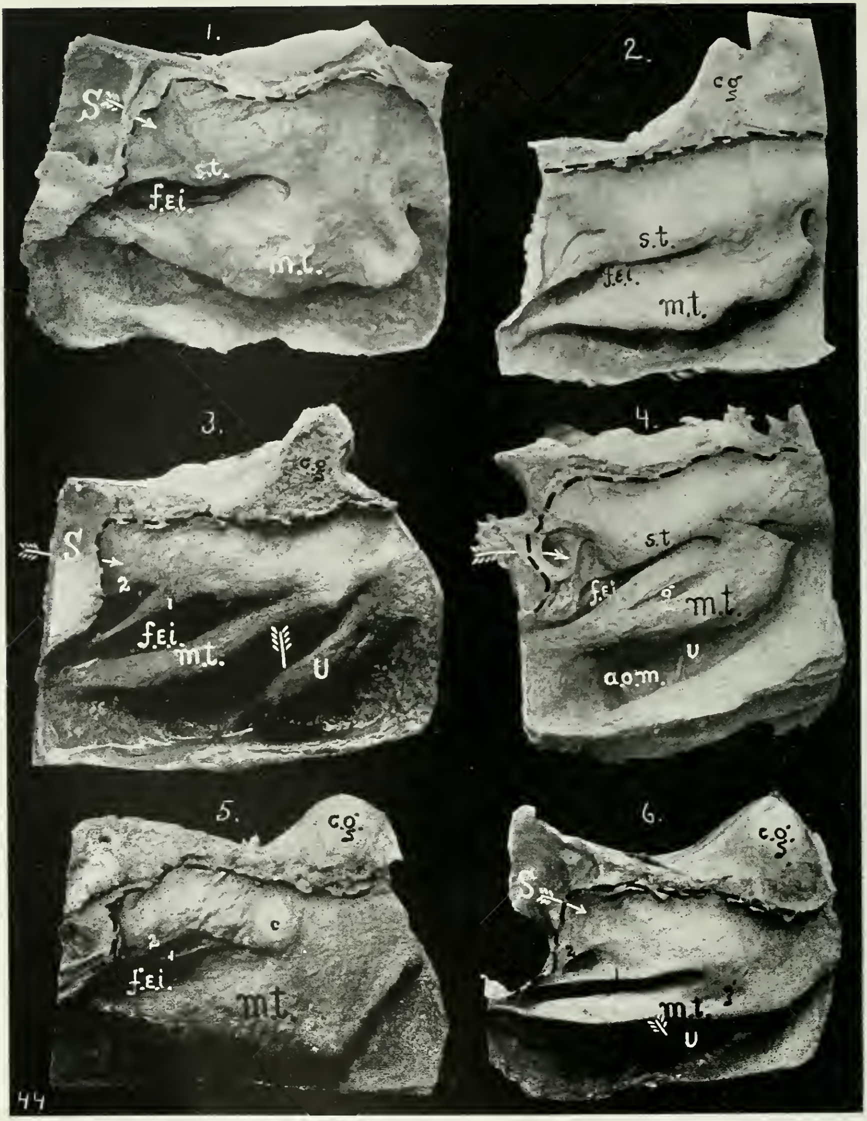

Fig. 44.—Internal surface of a series of middle left turbinates; dotted line marks roof of nasal fossa. **S,** sphenoidal sinus, with arrow locating ostium; **c.g.,** crista galli; 1 and 2, two superior turbinates; **m.t.,** middle turbinates; **f.e.i.,** inferior ethmoid fissure.

1. Sharp operculum.
2. Lower border of turbinate irregular.
3. Turbinate very much atrophied. Two ethmoid fissures very deep. **U**, uncinate process prominent, behind which arrow passes to antrum.
4. Average turbinate with short groove (**g**). **U,** uncinate process; **a.o.m.,** accessory ostium maxillare. Anterior extremity of turbinate incised as for its removal and exposure of structures external.
5. Normal and very regular turbinate. **c,** cell at extremity of ethmoid fissure forming a "tuberculum ethmoidale anticum." Two superior turbinates.
6. Long narrow turbinate; both ethmoid fissures show ostia of posterior ethmoid cells. **U,** uncinate process, with arrow leading to antrum.

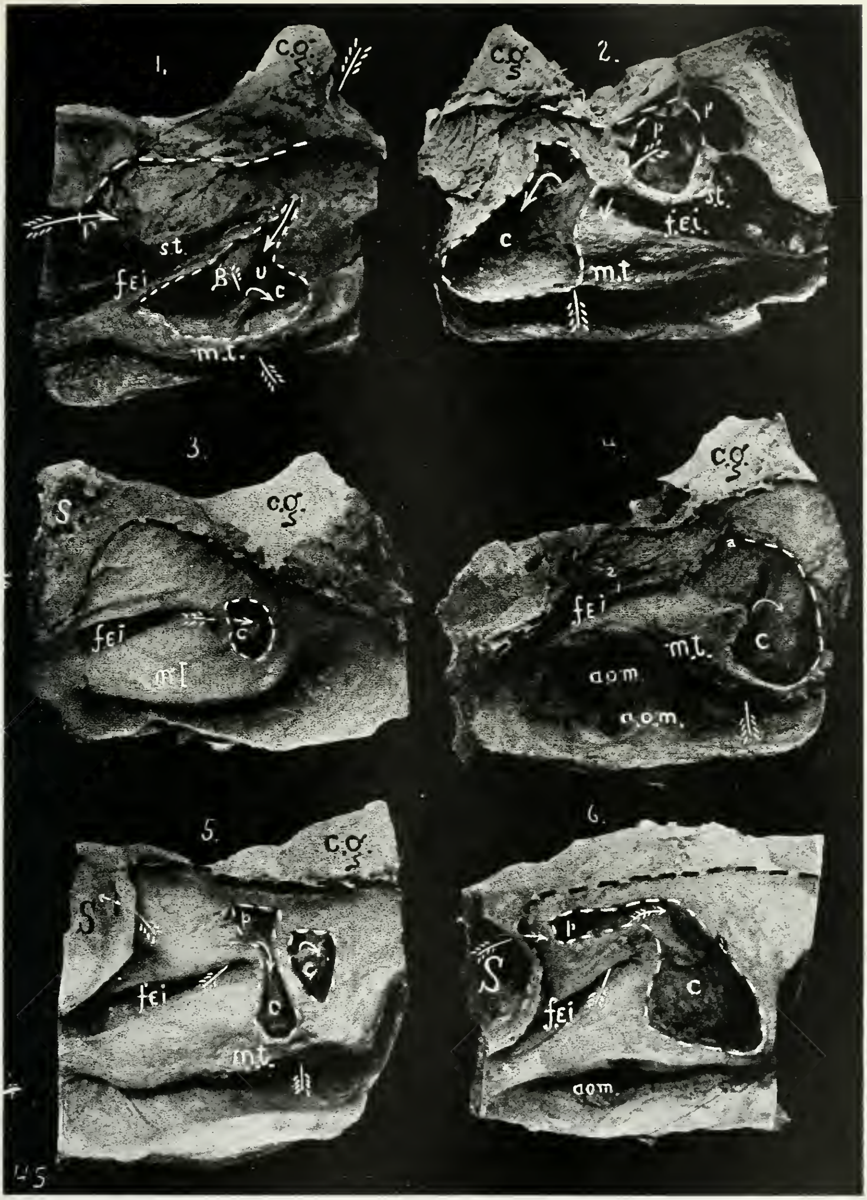

Fig. 45.—Internal surface of a series of turbinate bones which contain a cell (**c**). The internal wall of the cell has been partly removed, as shown by a dotted line. The horizontal line marks the roof of fossa. **c.g.,** crista galli; **s.t.,** superior turbinate; **m.t.,** middle turbinate; **f.e.i,** interior ethmoidal fissure; **S,** sphenoidal sinus with arrow through its ostium

1. **c,** cell, into which an arrow passes through a wide ostium from the middle meatus; **U,** uncinate process; **B,** bulla ethmoidalis; arrow passes between bulla and uncinate process to antrum. A long arrow passes from the frontal sinus to the middle meatus.

2. A large bullous cell, with arrow from middle meatus occupying the anterior half of turbinate. It measures twenty-three millimetres long, twenty-six millimetres high, and twelve millimetres wide. A posterior ethmoid cell (**p**) opens into the ethmoid fissure as indicated by arrow.

3. Small cell opening into the ethmoid fissure.

4. A large cell in the anterior third of turbinate, which communicates with middle meatus by a long semilunar ostium (arrow) and extends above it into an anterior ethmoid cell. **a.o.m.,** accessory ostium maxillare; 1 and 2, two superior turbinates. Turbinate cell measures fifteen millimetres long, twenty millimtres high, and nine millimetres wide.

5. A turbinate containing two distinct cells; the anterior one communicates with the middle meatus, the posterior with the ethmoid fissure, as shown by arrows.

6. A very large cell which is continuous with posterior ethmoid cell and opens into ethmoid fissure. **a.o.m.,** accessory ostium maxillare. It measures twenty-two millimetres long, thirty millimetres high, and nine millimetres wide.

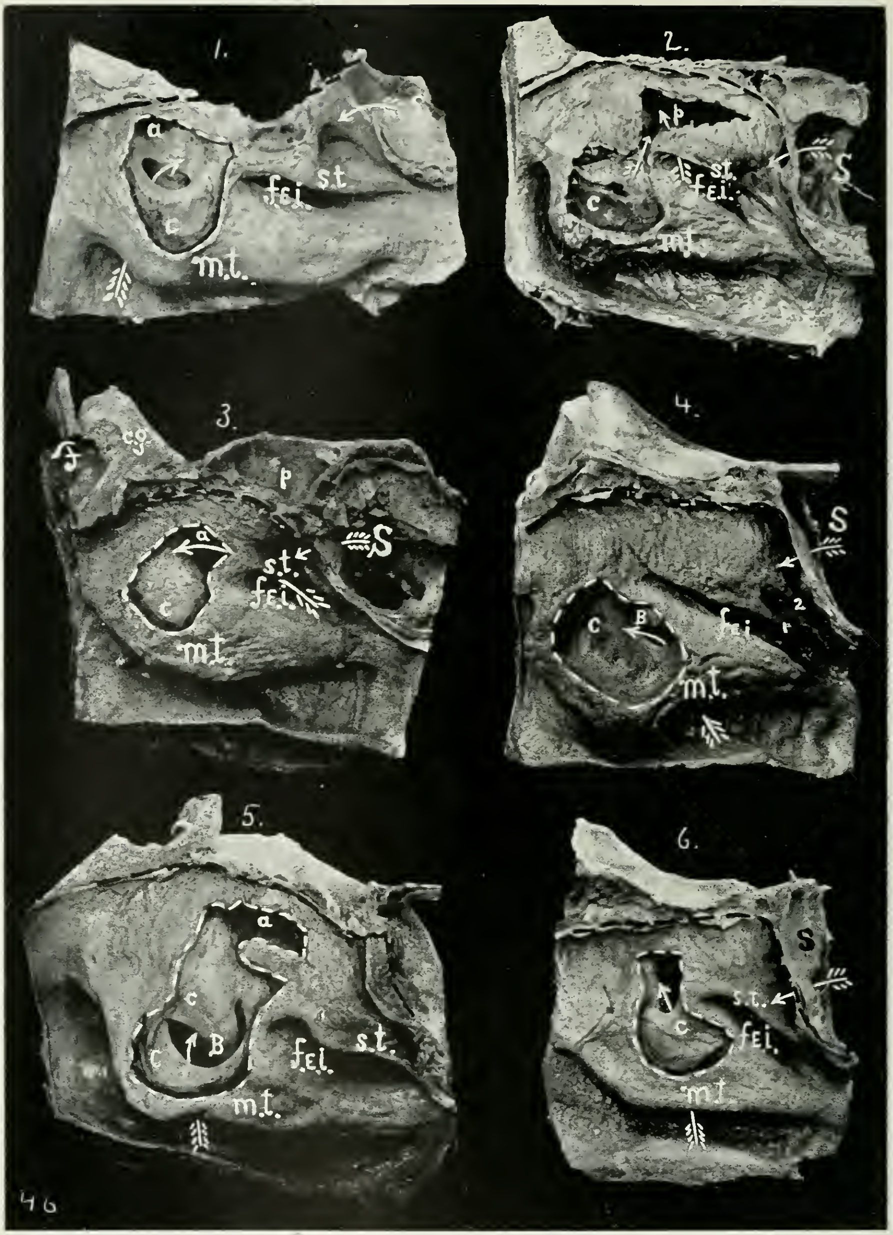

Fig. 46.—Internal surface of a series of right middle turbinates which contain cells; internal wall partly removed, as shown by a dotted line; horizontal line marks roof of fossa; arrows enter the cells (**c**) through the ostium. **S**, sphenoidal sinus with ostium; **s.t.**, superior turbinate; **m.t.**, middle turbinate; **f.e.i.**, inferior ethmoid fissure; **a** and **p**, anterior and posterior ethmoid cells.

1. Cell is continuous with a large anterior ethmoid cell which extends to cribriform plate. An oval ostium communicates with middle meatus.

2. A large cell communicates with an extensive posterior ethmoid cell, both of which have a single common ostium leading to the inferior ethmoid fissure.

3. The turbinate cell communicates with a posterior cell marked **a**, both of which open into the ethmoid fissure.

4. Large cell in anterior half of turbinate possessing a large oval ostium, through which the bulla (**B**) can be seen. 1 and 2, two superior turbinates.

5. Large cell which communicates with a large anterior cell extending to the cribriform plate. Through the large crescentic ostium can be seen the bulla. Cell measures twenty-two millimetres long, thirty millimetres high, and nine millimetres wide.

6. Cell opening into the middle meatus.

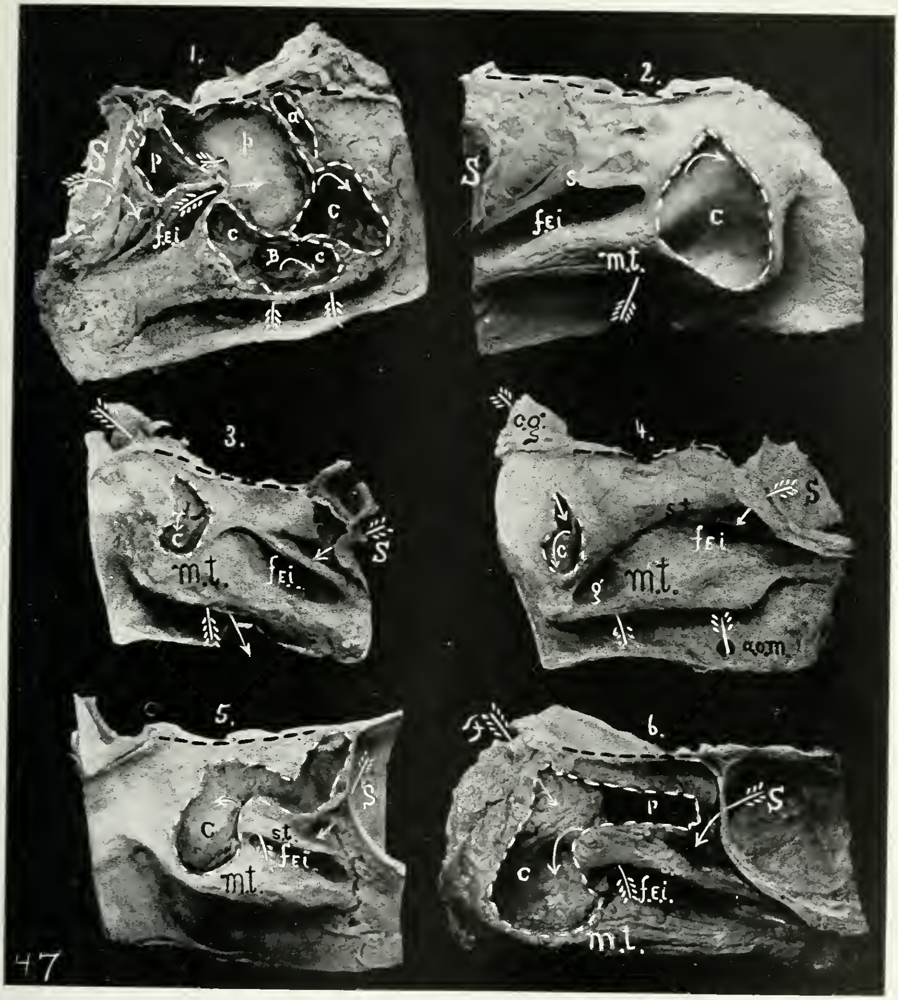

Fig. 47.—Internal surface of a series of turbinates which contain a cell (**c**), the wall of which has been removed and marked with a dotted line. Horizontal line corresponds to roof of nasal fossa. **S**, sphenoidal sinus, with arrow indicating ostium; **s.t.**, superior turbinate; **m.t.**, middle turbinate; **f.e.i.**, fissura ethmoidalis inferior; **a**, and **p**, anterior and posterior ethmoid cells.

1. Section passes through two cells in the turbinate and also some ethmoid cells; both turbinate cells open into the middle meatus.

2. Large cell measuring eighteen millimetres long, twenty-one millimetres high, and ten millimetres wide.

3. Small cell in upper portion of turbinate.

4. Small cell opening into middle meatus; posteriorly is a short, deep groove. An arrow passes from frontal sinus to the turbinate fossa; an arrow enters the antrum through the accessory ostium.

5. A large cell continuous with a posterior cell, both of which open into the ethmoid fissure by a common ostium. It measures twenty-two millimetres long, thirty-two millimetres high, and ten millimetres wide.

6. A large cell similar to 5, measuring thirty-three millimetres long, twenty-one millimetres high, and eleven millimetres wide.

AMERICAN LARYNGOLOGICAL, RHINOLOGICAL AND OTOLOGICAL SOCIETY.

PROCEEDINGS OF THE TENTH ANNUAL MEETING, HELD IN CHICAGO, MAY 30, 31, AND JUNE 1, 1904.

The society met at the Auditorium Hotel, under presidency of Dr. Norval H. Pierce, of Chicago.

An address of welcome was delivered by Dr. Frank Billings, of Chicago, on behalf of the local medical profession, after which the President delivered his address.

President's Address.

President Pierce pointed out the great changes that had been wrought in the special domain of laryngology, rhinology and otology during the life of the society. Ten years ago it was hardly more than a matter of sprays and spurs, of snares and syringes. The members no longer confined themselves to intra-laryngeal, intra-nasal and intra-cranial operations, but by most radical external surgical procedures it was the aim to cure the most extensive diseases of the nose and accessory sinuses, the larynx, the pharynx, the ear, and neighboring parts within the cranial cavity. This change had taken place gradually. It took years of endeavor to set the bounds of laryngoscopy, rhinoscopy, and otoscopy. Lately, by the work of Killian, Jansen, and of many of the Fellows, the advance had been made more rapidly, so that at the present time the well-rounded and successful specialist must not only possess that special skill and dexterity which enabled him to examine successfully the larynx, the nose, with the orifices of the several accessory sinuses, the ear, both by otoscopy and by means of complex functional tests, but he must combine with this a broad surgical knowledge equal to that of the general surgeon, and an ever-accessible knowledge of regional anatomy superior thereto. Thus did they prove the right to exist as specialists and members of the surgical department of the great science and art of medicine; but he expressed the fear that the pendulum might swing too far in the direction toward radicalism. With the technique of external operations firmly within grasp, were not the members liable to resort to them permaturely—to forget that much might be done by more conservative local measures, etc.?

Report of Meeting of Middle Section.

Dr. Chevalier Jackson said it was the custom for the chairman of sections to make a report each year, and then recommend the abolition of the sections. A wet blanket was put on sectional work in the shape of a resolution presented at the last meeting of the society, and which, he understood, was to be voted on at this meeting, relative to discontinuing the work of sections. In spite of this, he said they had a good meeting. There were about thirty members present. There were fourteen papers by some of the best men in the society, and this meant some of the best men in this or any other country. The meeting began at 10 o'clock in the morning, and the scientific program was finished by 5 o'clock in the evening. He heartily favored continuing the sections.

Exhibition of Mastoid Case.

Dr. William L. Ballenger presented a case in which there had been, after a secondary operation, Thiersch skin grafting in the mastoid wound. The surface was now almost completely healed except at the site of the orifice of the Eustachian tube. This was rapidly closing up, and he had no doubt that in a week's time it would be closed completely.

Some time ago he had another case similar to this in which the wound had been completely covered and the Eustachian tube closed. In this case he resorted to skin grafting in the mastoid wound, as in the previous case.

Exhibition of Specimens.

Dr. George L. Richards exhibited some specimens, and said a word or two as to the relation of the dentist to maxillary antrum trouble. The first specimen was a *tooth which set up antral disease*, the result of a capped tooth. He had seen it stated in some publications that dentists had been held responsible for setting up antral trouble by capping teeth that ought to have been treated otherwise.

He showed two interesting specimens of *foreign bodies removed from the nose*. One was a pants' button which a patient was said to have carried in his nose for seventeen years instead of on his pants. Another patient, said to have catarrh, had his catarrh cured by the removal of a cherry stone from his nose.

He showed a very large *adenoid* removed from a child, six years of age. The operation was done under ether anesthesia, the anesthetic having been given by a nurse. Just as the child was apparently under complete anesthesia, there was a spasmodic closure of the jaw, and immediately the child was asphyxiated. He had to resort to artificial respiration, hypodermic injections, forcing open the jaw, and traction of the tongue, otherwise he would have had a dead child. The adenoid was very large, completely occluding the naso-pharynx, and when closure of the jaw occurred at the last moment of etherization, no air entered, and consequently the child was asphyxiated. The child's breathing could hardly be noticed by the anesthetist. A trained etherizer would have noticed it. Many times ether had been given by a nurse to his patients, and yet nothing had happened worth mentioning. In etherizing a child with adenoids, one should closely watch the mouth and see that respiration was not interfered with.

The last specimen was an *arrow bougie,* which was used in the early stages of acute earache. There had been a good deal of trouble to get these bougies properly made, but the urethral bougie maker, Dr. Mitchell, of Philadelphia, had made them and put them up in nice shape. He passed them around. They could be washed off with warm water, dusted with lycopodium powder, and one could slip one into the ear of any child. One practitioner told him that he had used the bougie in a case without effort. He examined the child and found one-quarter of an inch of wax between the bougie and drum. The reason why the practitioner failed was evident. If the canal was patent in the early stage these bougies would do some good. They did not necessarily prevent incision of the drum, or anything of that kind.

Sarcoma of the Nose.

Dr. Wm. L. Ballenger said a young lady came to his clinic some months ago with a broad nose, and with a history of some pain and complete occlusion on both sides. He removed nearly the whole of the right inferior turbinated body, submitted it to a pathologist for examination, and received a report that the process was tubercular. This report, however, was not satisfactory to him. He removed some more tissue, submitted it for examination, and received a report that it was granulation tissue. He felt the case was one of sarcoma and decided to operate without any satisfactory miscroscopic diagnosis. He operated seven weeks ago by the radical method, as in his opinion, if he had operated by the intra-nasal method, the occlusion would recur inside of a week. With the Roe saw, after making incisions on the side of the nose, he went through the maxillary bone, turned the nose down over the mouth, and through this route he was enabled to remove a large amount of necrotic and mole-looking tissue from the nose on the right side. He found the bone completely necrosed, and he could pass his finger readily through the opening before using the saw. With the curette and other instruments, such as a biting forceps, he succeeded in removing almost all the turbinated tissue from both sides of the nose, and thus far there was no recurrence of the growth. After submitting specimens of the growth to a pathologist, he received a report that the disease was sarcoma. By operating in this manner he was enabled to remove more deeply seated tissue and thus get a correct report of the pathology of the growth.

This case illustrated the futility of relying absolutely upon microscopic reports in these cases, because in this case the microscopist, without knowing what it was, gave three defferent reports. First, he said it was a tubercular process. second, granulation tissue and, third, sarcoma of the nose. Whether tuberculosis was present or not, he could not say. The case did not impress him clinically as one of tuberculosis, but as one of sarcoma.

Dr. Wendell C. Phillips asked if syphilis was excluded in this case.

Dr. Ballenger replied, yes. He could get no history of specific infection or any suspicion of it.

Tonsillotomy Forceps.

Dr. H. Holbrook Curtis showed a set of tonsillotomy forceps which in his hands had proved to be very successful. The instrument was made by Matthieu, of Paris. The advantage of the instrument was that, in cases of children who had diseased tonsils, so small, however, that it was impossible to use a tonsillotome, the tonsil could be removed readily in one's office without an anesthetic. It was remarkable with what facility one could get at the tonsil and remove it. He had done a great many operations with this instrument. In a flat indurated tonsil very often while operating one found two or three drops of pus which explained the recurrent tonsilitis met with in these cases.

The other instrument was a modification of the fenestrated forceps figured in Bosworth's work. He had adapted it to the conformation of the posterior wall of the pharynx. With a forceps with an obtuse angle, one was apt to avoid a portion of tissue at the base of the vomer, but with a forceps at right angles, or five degrees less than the right angles, this little mass of tissue was entirely removed. It was this bit of adenoid tissue which furnished a starting-point for the recurrence of adenoid vegetations.

A New Mastoid Gouge.

Dr. Wm. Sohier Bryant showed the adaptation of a tool which was used for wood carving. It had been found quite convenient in carving the mastoid process, and in cranial surgery, etc. It could be used like a lever, and with it one could work with great accuracy, and a mallet was no longer necessary.

New Head Lamp.

Dr. Chevalier Jackson said some kind of light was necessary for all our work, but when a patient was under anesthesia the usual mirror was not satisfactory, for every time the position of the source of light or of the operator's hand changed, the mirror had to be changed. How some operators could get along without some kind of head-light at this, groping around in the dark as they did, and yet do the good work they undoubtedly did, he did not know. He did not know how they could tell normal from pathological tissue. One could tell diseased bone by the feel of the curette, but with the soft tissues he could not do this. For several years Dr. Day and the speaker had been using a lamp which he had devised for operating under anesthesia. It was a thirty-two candle power lamp, cheap, and could be bought for any current. It was frosted a little at the top in order to lessen the glare in the assistant's eyes. A little shield went back of it, which reflected the light forward and kept it out of the operator's eyes. It illuminated the whole field of operation, and gave plenty of light. It got hot enough to be sterile in its exposed part, but not enough to cause discomfort. The ordinary sterilized muslin operator's cap was worn over it, only the lamp and reflector projecting.

Tracheal Canula.

Dr. Ewing W. Day and the speaker had had about eight cases of post typhoid fever perichondritis of the larynx, followed by stenosis, six of them requiring tracheotomy. In some cases, when the abandonment of the tracheal canula was attempted, the patient did not get air through the larynx, owing to cicatricial stenosis; consequently they performed thyrotomy, retracted the thyroid cartilage, eviscerated the larynx, clipping out all cicatricial tissue. To keep the larynx open, they devised a T-shaped tracheal canula, one portion of which went up, and another down. One portion went up into the larynx and kept the lumen of the larynx open until most of the danger from cicatricial contraction was over. Healing of the tracheotomy wound occurred around this, so that a T-shaped tube could not be introduced, and to overcome this they cut it apart in two sections. One piece was slipped downward into the trachea, the other upward into the larynx, and the two locked together by a collar slipping over them. Outside a tape holder kept the dressing in place. The trachea could be measured through the tracheotomy wound before the thyrotomy, and the instrument could be selected to fit it. When in position the epiglottis came down and covered the top of the canula, the entire larynx being filled with the upper part of the canula. After the larynx was completely healed and its lumen lined with epithelium, one of these large intubation tubes was put in, in the usual way, through the mouth, the T canula abandoned, and the tracheotomy wound allowed to close.

Dr. George L. Richards suggested a modification of Dr Jackson's instrument. It seemed to him it would be a very inconvenient thing to keep on one's head. It was always wobbling, first one way and then the other. He was using a device which could be adapted to this lamp, and it could be obtained from most opticians. It was a perforated hard rubber ring which sets perfectly over the head, and could not be knocked off. One could adapt the same thing to this lamp with perfect ease. The one he used was made by Wall and Ochs, Philadelphia.

Dr. Chevalier Jackson said in regard to the modification suggested by Dr. Richards, that after the laryngeal lumen had been covered with epithelium, one of the large intubation tubes was slipped in and the tracheotomy wound allowed to close. If this were put in immediately after operation, the post-operative swelling and edema would render it dangerous if it should be coughed out. If the intubation tube should be coughed out, the edema and swelling, attended with a certain degree of paralysis, would cause an immediate stenosis, and would probably kill the patient. Many patients had died in that way. Their method had been to allow the larynx to heal completely and regain an epithelial covering. They kept the tube in two or three months. At the end of that time some of the patients would let them take it out, while others would not. They realized the trouble incidental to cyanosis, and therefore, they were much adverse to having the tube taken out. If the tube was taken out say once a month, then there was very little or no danger of stenosis. The tube should be taken out at least once a month, because otherwise concretions would form on it.

He did not offer it as an improvement on the O'Dwyer tube. There could be no improvement for the purpose for which the O'Dwyer tube was used. This tube, with wedged-shaped point put in a diphtheritic larynx, might result in traumatism, which was a bad thing in cases of diphtheria. But here the conditions were entirely different. Furthermore, one had the eviscerated larynx to deal with, requiring a large tube with a large interarytenoid swell and large retaining swell.

Dr. Edward B. Dench stated that while the device exhibited by Dr. Jackson seemed admirable, still the criticism would obtain that one could not control the electric wire either in hospitals or in offices. He asked Dr. Jackson if the lamp had ever exploded. He asked the question because shortly after Dr. Jackson demonstrated it at the last meeting there were two accidents, one in his own hands, and the other in the hands of Dr. Delavan, of New York. The current was too strong, and the lamp exploded, doubtless due to imperfect wiring. If there was any likelihood of the lamp exploding on the operator's forehead, of course, it was dangerous for the patient as well as for the operator. Perhaps this would not happen, if there was a good, strong safety fuse, and the possibility of the lamp exploding and doing considerable damage would be small.

Dr. Wendell C. Phillips referred to the accident which Dr. Delavan had experienced, which might have been serious, and considered the lamp which Dr. Jackson showed at the last annual meeting, in order to prevent any such possible accidents from occurring, needed some marked improvement in the way of safety.

Dr. J. A. Stucky stated that those who had not used this lamp, after having used it, would never be without it. It was as perfect as could be for mastoid work, or any operation where one had a large field and wanted plenty of light. He suggested one improvement, that is, covering the wire over the metallic edge of the band with rubber tubing. This would prevent the danger of imperfectly insulated wire getting wet with perspiration and creating a short circuit.

Regarding the objection mentioned by Dr. Richards about the head band not fitting, he had never found that trouble.

The thing that commended the lamp especially was the brilliancy of the light, simplicity, and its general adaptability. One could adapt it to any socket in the house or any hospital. A rheostat was not needed. He regarded it as one of the best instruments to have in that line.

Dr. George L. Richards said, with regard to the thirty-two candle power lamp and rheostats made, one would find the small lamp which he exhibited at two of the meetings of the eastern section very useful. He though it was an improvement on the lamp of Dr. Jackson. It had a mirror, so that it reflected light, and one could use it with a good sized small lamp and get as brilliant a light as he could with this one.

Dr. Edward B. Dench was very much interested in this subject, and hoped Dr. Jackson would not take his remarks in a spirit of criticism. This was a perfectly helpful piece of apparatus. He wanted it, however, free from danger.

As to the lamp described by Dr. Richards, with portable rheostat, he would say that in almost every instance where it had been operated in any regular hospital, something had gone wrong with the rheostat. He had used the instrument for a great many operations in hospital practice and had had no trouble, but if one put it in a strange plug something happened. He did not know what it was. When he was going to do operations in private houses he thought Dr. Jackson's lamp would be a great aid to him.

Dr. Norval H. Pierce had had three of Jackson's lamps for transillumination. One of them burned out in his own mouth; the other was broken accidentally, while a third exploded before it had been used. He had just screwed it into the socket, when there was a violent crash of glass, and everything was consumed. He screwed the lamp into the socket while the current was turned on.

He did not mention these accidents to throw cold water on the use of the lamp because he had been very much pleased with it and had recommended it. However, there was undoubtedly more or less danger attending its use, and it would be a very inconvenient, not to say dangerous, thing to have such an occurrence take place with a nervous woman.

Dr. Chevalier Jackson said he had already consumed too much time in speaking on this subject, but at the risk of being tedious he desired to say a word or two more in regard to the head-lamp. It was an entirely different thing from the transilluminating lamp. Dr. Delavan wrote him regarding his experience with the transilluminating lamp immediately after it had exploded. He wrote the manufacturers of the lamps, and they said that of all the lamps they had sent out, this was the only one they had heard of as having exploded. When these lamps came into use for general commercial purposes, and were manufactured cheaply, some of the lamps turned out were defective, and the Delavan lamp might have been one of that class. That these lamps could be made safe was claimed by the manufacturers. If his experience had been that of Dr. Pierce, or that of Dr. Delavan, he would not touch the thing, however, he had used the same original six lamps for several years and had not had any accidents or explosions, and he would continue to use them for that reason. He had no doubt that some defective lamps had been sent out, but what the defect was or had been he did not know. This, however, had nothing to do with the large head-lamp shown to-day. It could not explode.

Office Appliances.

Dr. Wendell C. Phillips exhibited and described several office appliances.

Dr. Chevalier Jackson presented the following report, and exhibited a specimen for Dr. John S. Mabon, of Allegheny, Pa.

Report of a Case of Tonsillolith and Exhibition of Specimen.

The principal point of interest in this case was the exhibition of the specimen, as unfortunately the author did not see the patient until after the tonsillolith had been expelled.

Mr. S., aged about 55 years, came into his office and stated that he had not called upon professional business, but on a matter of scientific interest. For several months he had been troubled with a cough, especially in the mornings. At times it was so severe that it would produce emesis. On this particular morning it was so pronounced that he resolved to consult a physician. On his way to the doctor's office the man had an attack of coughing, during which he expectorated the tonsillolith. Dr. Mabon was rather incredulous, and asked the man if he had expectorated it on the sidewalk, from which he recovered it. The man replied, rather heatedly, "I didn't imagine that it came from my throat, because I took it out from my mouth."

On examination, the only abnormal condition apparent was a peculiar glairy appearence of the edge of the posterior half-arch on the right side. On introducing his finger Dr. Mabon found a cavity between the half-arches fully large enough to accommodate the specimen. There was no hemorrhage following the expulsion of the tonsillolith, nor was there any denuded point on the membrane. It was the intention to have a section made of the specimen, and an analysis of the filings, in order to show the strata formation and its composition, but the chemist advised against it, fearing destruction of its contour.

The weight of the specimen was 147 grains. Mr. S. told him that about ten years ago he expectorated a stone in the same manner, which was about the size of a split pea.

Dr. Robert C. Myles said that not long since he had a patient whom he tried to cure by a radical operation by removing the floors of both frontal sinuses, and in one of the sinuses he found that secretion took place behind the orbit, and being desperate in regard to effecting a cure, he followed the floor of the frontal sinus beyond the eye so far that he got into the post-orbital space, and as a consequence he had a post-orbital abscess from infection. He did not see how he could have avoided it, and how he could have obliterated that part of the sinus unless he removed these floors. The man recovered with good eye-sight. A large quantity of pus escaped through an inch and a half incision, which was made. There was some inflammation of the retina, so that the case looked serious for a while. Patient had double vision, but this was relieved. In the future he would not go so far back; he would rather trust to better drainage into the nose. The unfortunate part of it was the stab behind the eye.

Some Points in the Pathology of "Bone Cysts" in the Accessory Sinuses of the Nose.

Dr. A. Logan Turner, of Edinburg, Scotland, read a paper on this subject. For want of a better descriptive title, the author included under the term bone cysts those cases of cyst-like distension of the air sinuses which were from time to time met with and which must be regarded as a pathological condition distinct from the suppurative affections of the sinuses.

Distension of the walls of the ethmoidal cell labyrinth, of the frontal sinus, and of the antrum of Highmore had been described, but so far as he had been able to ascertain no similar condition of the sphenoidal sinus had been met with. The condition was the same in its clinical course and in its origin whichever cavity it effected.

An analysis of the various published cases illustrating this condition revealed the interesting fact that in some the bony cavity merely contained air; in others the contents were of a mucoid character, while in a third group of cases pus or muco-pus was found.

Perusal of the literature dealing with cyst-like disfension of the middle turbinal, so far as the author was able to gain access to it, furnished him with the report of 46 cases, although a number of other instances had undoubtedly been met with. Of the 46 cases, 26 occurred in women and seven in men, the sex in the remaining thirteen cases not being stated. The female sex, therefore, showed a considerable preponderance. In fourteen cases the right, and in sixteen the left middle turbinated bone was the seat of the affection, while in five the condition was bilateral. In fourteen no statement was made regarding the side of the nose affected. In 24 cases the age of the patient was stated. The youngest was 16, and the eldest 65 years of age. Three were below 20, and four above 40 years of age. The majority, therefore, were in middle life. The condition had not been observed in childhood.

In regard to the origin of a small number of these cases, there was evidence to show that the condition was not a strictly pathological one, but rather the result of an excessive anatomical development or overgrowth of the normally existing air space.

The chief symptoms complained of by a patient suffering from distension of the middle turbinated air cell were usually those of gradually increasing nasal obstruction, commonly unilateral, and pain varying in degree and in situation, sometimes of the nature of headache of a very severe type. Intranasal examination revealed a swelling of varying size presenting a smooth uniform surface, perhaps of a somewhat paler color than the normal mucosa.

The author had been able to analyze fifteen cases of this affection to which the term ethmoidal mucocele might be justly applied. Of these, eight occurred in males and six in females, the sex in not one being stated. The majority of the cases occurred during adolescence. Thus, of the fourteen in which the age was recorded, ten were met with between the age of twelve and twenty, three between twenty and thirty, and one was only 32 years of age. As regards the side of the nose affected, information on this point was to be found in eleven of the cases. In one the affection was bilateral; in ten, unilateral, the right side being affected in four and the left in six. In all, with two exceptions, the contents of the distended cavity were of a mucoid character, having a viscid tenacious consistence.

The author discussed at length distension of the air cells situated in the lateral mass of the ethmoid bone; the differential diagnosis; the maxillary antrum, etc.

Discussion:—Dr. D. Braden Kyle was asked to open the discussion. He said he had been very much interested in the views of Dr. Turner. The question of cysts, especially bone cysts, was important chiefly in regard to etiology, the classification of which he gave as follows: (1) Those that formed in a cavity already existing, such as retention cysts, due to the dilation of the follicles of the mucous membrane lining the cavity. (2) Those resulting from some pathological process in the tissues, a cystic degeneration following inflammatory processes.

About the nasal cavities, either in the turbinated bones or accessory cavities, we had cysts, as has been shown, nearly all of which cavities communicated with the surface. Personally, he believed he had seen quite a number of cysts of the turbinate involving the ethmoid cells, which were largely retention cysts.

A curious feature regarding cysts was that, as a rule, they formed in a locality of good blood supply, with the exception of those found in a bony cavity. Occasionally one found cysts forming in cartilaginous structures, but this was rare. With the exception of dermoids, he believed the original exciting cause of cysts was undoubtedly an inflammatory one. With the minute openings of the various cells of the turbinates and accessory cavities, it was readily understood why we could have beginning rentention cysts.

Dr. Frederick C. Cobb said he had had three or four cases of dentigerous cysts and had therefore been much interested in what Dr. Turner had said. There were two or three points in his paper which impressed him as being of the greatest interest. One was that a diagnosis between antral disease and cyst after puncture of a dentigerous cyst was comparatively easily made. If one first punctured the wall, he went through the thin shell of the bone cyst, and then through this wall. if a canula; then without removing the canula, if the trocar was pushed farther, fluid would come out through the nose, so that one could differentiate easily between antral disease and cysts.

It was an interesting thing to him to see whether these cysts subsided after simple puncture and the removal of the tooth. He took the trouble to trace his cases for a year or two, especially those which had simply an offending tooth removed, and he found to his surprise that in that interval the whole bony wall had subsided, so that the face was normal in appearance, whereas before the puncture the antrum seemed much larger, showing that operation on these cysts was certainly frequently unnecessary, and that cases did not require more than the removal of a tooth and puncture to effect a cure.

Dr. Robert Levy said, in addition to the symptoms enumerated by Dr. Turner, in the few cases of cysts of the middle turbinate he had seen, the most prominent symptoms had been reflex ones. In a number of instances there was pressure, inducing very pronounced neuralgic pain and sneezing. In one instance he felt he might attribute asthma, at any rate in part, to the pressure of a large middle turbinated cyst.

Dr. Robert C. Myles did not think that many of the members knew enough about the cause of bone cysts to discuss the subject intelligently. It was probable that from the earliest time these bone cysts had been associated with nose trouble. Attention had been called to cysts in the ethmoidal region by ophthalmologists, and, if possible, it would be interesting to know the probable cause of them before beginning treatment. The condition seen in these cases was evidently due to extension of the pathological process, and this extension must be ascribed to confinement. Whatever the incipient change might be which took place to start these cysts in their embryonic state, so to speak, it needed further consideration. For instance, he could not understand how a pyogenic condition could produce bone cysts in the sense of secretion of mucus. He could not understand their purulency. It was thought that the secretions in passing through the membranes produced a pyogenic condition, and we had these cysts starting in the ethmoid region. Most of the members had undoubtedly seen cases in which there had been an extension of the pathological process from the sphenoid bone to the frontal, but which did not require any operation. These cases were easily cured by making a large opening from the cavity into the nose, inserting gauze and retaining it until the walls had become hardened.

Cysts of the antrum were moderately common, and the author's experience had been that the outer wall of the antrum became so thin that the finger could crush it in about the malar ridge, and one could easily penetrate this ridge for operative or other measures of treatment.

About two years ago he was called by a prominent physician to assist him in operating on a woman. He stated that the woman would not consent to have any one operate upon her except himself, but he wished Dr. Myles to be with him. The case was one of large cyst of the antrum. Some destructive changes had taken place in the wall of the cyst, and there was a purulent condition. Under his direction the surgeon made an incision about an inch and a half or an inch and a quarter in length. curetted the antrum thoroughly, and got a large opening. The woman made an uninterrupted recovery.

As to frontal sinus disease, the last case the author had was a woman 73 years of age, who had a cyst extending from the frontal sinus to the anterior ethmoidal sinus. In removing the anterior ethmoidal cell it was his intention to remove the anterior part of the frontal sinus, also to remove the anterior ethmoidal. The woman's heart failed under the anesthetic, and she was practically moribund.

He had made a promise that in event of serious trouble he would cease operating. He removed the anterior ethmoidal cells under cocain and made a complete opening from the front. At the end of three weeks the woman was perfectly well. How long the condition had existed he did not know.

Dr. Turner in closing the discussion, thanked the gentlemen for the very cordial way in which they had received his paper. There were many points he would like to discuss, but time did not permit him to do so.

With the secretary's permission, he would like to change the title of his paper from Etiology to Pathology, as he thought it would read better.

Dr. Lewis A. Coffin, of New York City, read a paper entitled

Report of Four Operative Cases of Sinusitis in Children.

with a presentation of specimens illustrating the development of the sinus.

He reported in detail the histories of four cases of sinus disease which he had met with in young children. He brought out the peculiar and somewhat obscure symptoms found in such cases, and dwelt particularly upon the question of the existence of a true inflammation of the antrum of Highmore in children, demonstrating from his carefully prepared specimens that the antrum of Highmore in the infant occupied an entirely different position relative to the orbit than in the adult, which rendered it anatomically almost incapable of being involved through trauma. By means of a most beautiful series of wet specimens and lantern slides he further dwelt upon the relation to one another of the various sinuses in the infant and their mode of development, showing that the frontal sinus is absent in earliest infancy, only begins to develop after the seventh or eighth year, and often does not attain its full development until puberty.

Discussion: Dr. A. Logan Turner said he had listened with a great deal of pleasure to Dr. Coffin's valuable paper, and he congratulated him heartily on the specimens, which were of great value. He envied the opportunity he had of obtaining the material, because such material obtained at that age was all the more valuable.

The author of the paper raised the question of antral abscess in the infant and young children. Most of the members were doubtless familiar with Dr. Myles' paper on that subject, and also with reference to other papers by different authors upon antral suppuration in infants, ranging in age from three to six weeks old. The speaker always had difficulty in understanding how such a thing could be, and he had favored Dr. Coffin's side of the question along with Repke and others, and took issue with Dr. Myles. One had only to look at Dr. Coffin's specimens to see how difficult it was to realize that there could be such a thing as chronic antral abscess in infants and young children. He was in sympathy with Repke that the condition was probably an osteomyelitis of the superior maxilla, but whether it was of tuberculous origin or not, was a bone of some contention. Some cases were undoubtedly of tuberculous origin.

The question of the frontal sinus early in life was also interesting, and he still thought the various opinions that had been expressed were due to the views which men took in the commencement of its development. But there was so much variation in the sinuses, both in the adult and the infant, that he was not surprised at variations in the time of development.

He was interested in what Dr. Coffin had to say in reference to what he presumed was an old theory. He had seen it mentioned before, namely, the probable development of the sinuses from pneumatic pressure. This was new to him, and it was certainly a view which required thinking over.

With regard to the absence or presence of the frontal sinus, more especially with reference to Lothrop's statistics, he was much impressed with what Lothrop said in his paper by the fact that he very rarely saw any frontal sinus. This statement was in opposition to the speaker's own observations. He found eighteen per cent of skulls, even a little more, in which one or both frontal sinuses were absent. The difference in results was due to the way of looking at the matter. He considered the frontal sinus absent if it did not lie above the level of the fronto-nasal suture. Anything which lay more in the orbital or ethmoidal plate—anything that passed above the fronto-nasal suture was frontal sinus, and he thought he was right when he recalled Lothrop's words to the effect that he (Lothrop) considered the frontal sinus present when there was extension into the orbital plate. Inasmuch as there were ethmodial extensions into the orbital plate, the speaked did not think we had any right to look upon them as frontal sinuses. This was the reason for the difference of opinion.

Dr. Wendell C. Phillips desired to call the attention of the members to the fact that the preparation of a paper of this kind meant an enormous amount of work. For two or three months Dr. Coffin spent a great deal of time in the preparation of the specimens he had exhibited, and the speaker felt that the society was indebted to Dr. Coffin.

Dr. J. A. Stucky was very much interested in, as well as edified by the paper, and yet a little surprised. He was surprised that with all the clinical material which New York city furnished, the essayist should have seen or had so few cases. Even in the little city where he hailed from, he had a record of seven cases. He was sure he had had more than that, but he could only find the records of seven cases which he looked up after he received the programme. Four of these required an external operation. There was a fistulous opening, and a diagnosis had been made of dacryocystitis. All that was necessary in these cases was to enlarge the opening through the wound, curette thoroughly, and close it up. In the other three cases the external tissues were not perforated, and the condition was relieved by a free opening through the nose. The ages of these patients varied from two years and five months to eight years. In one case, eight years of age, the maxillary antrum was involved. All of them had adenoids. He made special mention of that as well as enlarged tonsils. In addition to the fistulous opening in two cases, he had ectropium without any adhesions.

The essayist mentioned a tubercular history. He did not find that existing in any of the cases he had seen, and all of them made good recoveries.

Dr. Robt. C. Myles said the members were indebted to Dr. Coffin for his demonstration. Having worked along these lines for many years, he knew what labor it took to present a subject so well as he had presented it, and there was no doubt but what we were in the dark in regard to these cases. Probably it was better for many of the patients that we were in the dark. Those who were careful observers saw quite frequently infectious diseases invade these sinuses, and they of themselves got well frequently, and it was only in that class of cases in which there was stenosis, obstruction or confinement of the pyogenic conditions (and it was only in that class of cases that one needed to operate, liberating the gases and pressure therefrom) which caused necrosis and sloughing of the mucosa.

In regard to the remarks made by Dr. Stucky, it must be remembered that there was only one of him in Lexington, while there were several hundred specialists in New York, and if they were to compile general statistics, they might come up with him. These cases were occasionally seen in children in which there was necessity for interference. Occasionally patients were seen who suffered from too much surgery as well as from the disease. When free drainage was established, and asepsis thoroughly carried out, very frequently many of the cases recovered in a most miraculous way. He thought the removal of those teeth which were still dormant in the antrum of children was very frequently the cause of the stubborn resistance to get better. He had seen cases of this kind, and thought if the region in which these teeth were buried and growing was let alone, and the surgery was directed above them, we would get much better results.

The question of the frontal sinus and sphenoid was not near so important as the one of the antrum and ethmoid.

Dr. Coffin, in closing the discussion, said that Dr. Turner quoted Repke as saying that he seldom saw a case without the frontal sinus. Repke emphatically stated that it might only be present when there was extension into the orbital plate. The speaker said it was altogether a matter of understanding terms, and he thought it was time the profession got together and recognized the nomenclature of this subject. For instance, not long ago he listened to a paper in which the author spoke of the accessory ethmodial sinuses. He wondered what was meant by accessory ethmoidal sinuses. When he came to show the specimens, he found it was what Mouret had called ethmoido-lacrimal cell. It was very well named and one knew exactly where to look for it. It was very essential for one to arrive at some understanding in talking about these things. If one meant by frontal sinus simply a cavity in the vertical or cancellous portion of the frontal bone, he would be understood. If the doctor meant a cavity in any part of the frontal bone, he was entirely right. In the specimen which the speaker showed there was just the external part of the ethmoid cell. This was all. One could call that the frontal sinus, if he so desired, but it was questionable.

He was much interested in Dr. Stucky's remarks from a clinical point of view, although they had no direct bearing on his own paper. He was interested more particularly in what was said regarding the development of the cells, and it led up to the statement of Dr. Myles that frequently too much surgery was done in many cases, and that many of them get well without treatment. He believes in hammering away at this thing until the general practitioner recognized a condition that could be treated. A great deal could be done for these patients with treatment, and this treatment did not mean surgery.

One of the points he wanted to make especially in his paper was that in infants and children, and up to those shedding the first teeth and permanent teeth, we could not do a satisfactory external operation on the antrum.

Dr. Ewing W. Day and Dr. Chevalier Jackson, of Pittsburg, Pa., read a joint paper entitled:

Purulent Otitis Media Complicating Typhoid Fever.

The authors considered deafness, otitis externa, disorders of the perceptive apparatus, acute catarrhal otitis media, myringitis, and acute purulent otitis media as complications of typhoid fever.

In an examination of the ears of typhoid fever patients, they were at once impressed with the fact that practically all cases could be classified into two great classes, dullness of hearing with and without evidence of inflammation of the middle ear. This dullness of hearing was analyzed as to cause in fifty-one selected non-suppurative cases. It was found to be due to the tube in one, because the patient, a mild case, volunteered the statement that he heard better after swallowing three or four times, and on test was found to hear normally. Only twelve cases were catheterized as a test and they were all patulous. Dullness of hearing was found to be due to non-suppurative middle ear conditions in seventeen cases. Some of these might have been tubal. The perceptive apparatus, including the sensorium, was found at fault in twenty-three cases both perceptive and conductive mechanisms in ten cases.

The only complications were erysipelas and mastoid empyema. Erysipelas occurred in three cases. It was located on the face and scalp of all, but it seemed doubtful whether the infection was secondary to the ear condition. It occurred in a number of cases of typhoid fever uncomplicated by otitis, or any other lesion. It did not seem to influence the otitis in any way. Purulent otitis resulted from extension of the erysipelas in one case. Mastoid empyema occurred in twenty-six out of twenty-eight (29.5 per cent.) of the purulent otitis media cases. Mastoid tenderness occurred without pus formation in 31 per cent of the cases. This appeared at the outset of the malady, and always disappeared, in some cases not reappearing, and in others returning with pus formation in the mastoid cells. The large percentage of mastoid complications in the purulent otitis cases was due probably to three causes—virulence of the infection, lowered resistance, and the almost constant dorsal decubitus which favored the collection of pus in the antrum. This was especially true of cases where, on account of intestinal hemorrhage or other reasons, the pillow was removed and the foot of the bed was elevated. Gravity had no opposition on account of the absence of the cilia in the mucosa of the aditus ad antrum.

Every purulent case of otitis so treated by elevation of the foot of the bed that did not die too soon of conditions remote from the ear developed a mastoid empyema. There were four of these cases, one unilateral, and three bilateral. All the bilateral cases developed bilateral mastoid empyema. The low resistance was shown in one case, where, after cleaning out the mastoid down to healthy bone, the first dressing revealed large patches of bone, dead because it had not sufficient vitality to resist invasion. There were no peculiar features about the mastoid cases except the very rapid destruction of tissue and the fact that the temperaure was absolutely normal for a week or more before the operation in fourteen out of twenty-six (53.8 per cent) cases. Evidently there was little power of absorption in the mastoid portion of the temporal bone. When the pus broke through into the soft tissues of the neck, as it was allowed to in one case, the usual pus chart appeared. In six cases out of twenty-six (23.1 per cent) the temperature ranged to 99 or 100 and back to normal. In 5 out of 26 (19.2 per cent) the range was to 104 degrees and back to 99 or 100 degrees, but in these cases the authors could not exclude the possibility of its being due to pus in other locations or to typhoid fever reinfection.

Discussion:—Dr. Edward B. Dench congratulated the author on the very exhaustive study which they had made of these cases. What was said regarding the involvement of the perceptive mechanism in these cases was open to question. It was not necessarily due to involvement of the labyrinth. It was due to the involvement of the higher cerebral centers. The authors spoke of the complication occurring in 88 out of 180 cases, which was only a fair proportion of what one might expect in cases of acute infectious disease. One frequently found mixed infection in a great many cases of acute inflammation of the middle ear complicating the acute infectious diseases. A mixed infection was oftentimes a simple infection.

The authors' investigation in regard to the primary condition of the mucosa of the tympanum, that is, incising the membrane in the early stages of the disease before it was practically secure in typhoid fever cases, to determine whether the middle ear contained any pathogenic organisms or not, bore out the assertion of a practitioner who made a series of experiments on this subject and concluded that pathogenic organisms were found in the healthy tympanic cavity. For instance, one would find the staphylococcus, the pneumococcus, the diplococcus, distinct from the pneumococcus sometimes, also the streptococcus in a normal tympanic cavity.

As to the appearance of the canal, in some the fundus was filled up by an epithelial plug, and this plug undergoing disintegration, when examined, was found to contain certain bacteria. This varied in different cases as the same as one found an acute purulent otitis occurring as a complication of any acute infectious disease. The appearance of blebs in the external auditory meatus and on the surface of the membrana tympani seemed to be characteristic of a severe form of otitis media and clinically characteristic of typhoid fever.

The development of acute otitis media in the course of typhoid fever depended very much upon the surroundings of the patient, that is, whether the patient was under the best hygienic surroundings or not, and upon the conditions of the patient at the time the typhoid infection occurred. This was borne out by the experience the speaker had had in typhoid fever cases. He had found a complicating otitis media rare in typhoid fever. He thought the resisting power of the patient at the end of the second week, or the beginning of the third week, and from that time on was a sufficient reason for the late development of acute otitis media. The otitis was simply favored by the run-down condition of the patient. This was the exciting cause. The dorsal decubitus was an important factor in favoring infection of the tympanic cavity by germs which might be present in the naso-pharynx.

Dr. J. A. Thompson asked the essayists whether they had under observation in their series of cases a complication that was sometimes confusing in diagnosis, but when observed accurately it was not, and that was, abscess of the parotid gland, which penetrated to and caused apparent suppuration of the ear when the ear itself was not involved.

He had been asked twice in the past year to make mastoid operations of such cases and had been able to demonstrate in both from the origin of the swelling that a large amount of pus came from a suppurating parotid gland.

Nothing more was necessary than a careful external incision to avoid the facial nerve. With this in mind, the diagnosis ought to be comparatively easy in these unusual cases.

Dr. J. A. Stucky stated that 18 months ago he was called to see a case in consultation (typhoid fever case) in which there was a little ear trouble in the second or third week of the disease, which very readily yielded to local treatment. Ten days later the patient went into a delirious condition. He was told about it, and suggested the possibility of mastoid involvment, and perhaps otitic meningitis. This was laughed at. The patient died promptly, and at the post-mortem examination both mastoids were found filled with granulation tissue, the epitympanic wall eroded, the middle ear full of pus, and eustachian tube patulous. Since then he had held five post-mortem examinations on cases that died of typhoid fever and two of pneumonia. None of the five presented at any time symptoms of ear trouble, yet all showed degeneration of the mastoid cells and antrum, with the middle ear filled with pus. He was beginning to suspect, if any of his patients with typhoid fever had that form of delirium, with head tossing from side to side, involvement of the mastoid of which the general practitioner was not aware. So far as he knew, we had no pathognomonic symptom or symptoms of mastoid involvement. Some of the worst cases of mastoid trouble he had operated on had absolutely no symptoms of mastoid disease, so far as pain, swelling, etc., were concerned. He was informed by Dr. Von Klein, who was present, that in his investigations it was recorded by eminent observers that the bacillus typhosus and pneumococcus were frequently found in the ear when they were not found in the lungs, in the alimentary canal, or anywhere else. Whenever he saw involvement of the lympathic system in typhoid fever or in pneumonia, he suspected mastoid suppuration as a probable cause.

Dr. Carl E. Munger called attention to a case of mastoid involvement in typhoid fever for the purpose of emphasizing the point made by Dr. Dench in regard to the time of occurrence of the complication, which was during the latter part of the disease in his case. It occurred during convalescence. The man was of foreign birth, a Swede, and the conditions in the ward of the general hospital in which this man was were not ideal.

Dr. Jas. F. McKernon believed it was just as important to make a frequent aural examination in typhoid fever as in any other of the acute infectious diseases. If these examinations were more frequent, we would have less trouble following that disease from chronic catarrhal affections of the middle ear and of the labyrinth.

So far as the prognosis in these cases of middle ear trouble was concerned (and he meant the chronic type following typhoid fever, in almost all cases it was bad, so far as recovery of normal hearing was concerned.

He differed from one of the previous speakers and believed that the disturbances were distinctly of the labyrinthine type, and not of the cerebral.

Dr. Chevalier Jackson, in closing the discussion, said there were just a few points he would like to refer to, and one in particularly relative to extreme tenderness over the mastoid in the early days of the otitis. In many of these cases, on the first day of the appearance of the discharge, the mastoid would be so tender that patients would not allow one to touch it. Only a few of these cases ultimately developed pus. Sooner or later they all subsided, and whether it was a true periostitis or not, he did not know. When pus formed in these cases there was usually no tenderness. The ordinary mastoid symptoms were often absent, and yet the entire mastoid would be found broken down. There was no tenderness at all in some cases. One case in particular was brought in from a hospital in one of the smaller cities. The patient had typhoid fever, and was sent in as a typhoid case. There was a slight discharge from the ear, and in palpating over the mastoid one could feel that the whole cortex was broken in. One could feel a loose sequestrum composed of cortex. The whole mastoid was broken down, and yet the patient would not acknowledge that it was tender.

In regard to the criticism concerning the bacteriology of these cases, the statement in the paper was that acute purulent otitis media was usually, not invariably, mono-microbic.

In regard to epithelial plugs and blebs being characteristic of typhoid fever otitis, this was not stated. The paper was simply a record of observations. Very many of the cases presented the ordinary picture of acute otitis media.

In regard to parotitis, Dr. Thompson spoke of abscess of the parotid gland bursting into the canal. This did not occur in the cases of the authors, for the reason that the cases were all kept under observation and as soon as parotitis developed, the parotid gland was incised long before there was pus formation. Pus did not form at all, and for that reason they did not get that kind of cases.

As to the diagnosis, one of the speakers stated that it was comparatively easy, and that after the discharge began an immense quantity of secretion poured out. It was bloody serum to begin with, and later became purulent in spite of all they could do to keep the parts aseptic.

Out of eighty-eight cases of purulent otitis media, twenty-five went on to mastoid abscess.

In spite of the best care they gave these cases, watching them every day, examining them with mirror and speculum carefully, they could not prevent the development of mastoid abscess.

One of the speakers said that he did not regard the number great; that is, eighty-eight cases of purulent otitis media out of seven hundred and eight cases, which meant that about 11.3 per cent of the cases of typhoid fever developed purulent otitis media. That seemed to them enormous. At the present time it was down to no cases at all, or was at the time they left Pittsburg.

Their research into the etiology was very extensive and interesting, and he regretted the lack of time that prevented its reading, for the discussion and criticism by the eminent gentlemen present would have been interesting and profitable.

Dr. Jas. F. McKernon, of New York City, read a paper entitled:

Chronic Otitis Media, Chronic Mastoiditis and Jugular Bulb Thrombosis.

The author reported a case of chronic otitis media, complicated by chronic mastoiditis and jugular bulb thrombosis, with operation and death. The patient, a boy of five, had scarlatina seven months previously, with a discharge from both ears. One ear ceased running after six weeks; the other continued to discharge intermittently. During the periods of intermission the child was peevish, drowsy, and constipated; the tongue coated; the breath foul. There were headache and earache. While the ear discharged the patient's condition was approximately normal. Three weeks after the ears became affected there was pain behind both ears, worse on the right side, for ten days. On examination the right canal was found red, excoriated, and filled with a foul, thick discharge. The drum was perforated over the Eustachian orifice, and in the posterior superior quadrant granulations and dead bone were discovered. The left drum had healed. A diagnosis of intratympanic caries was made and operation advised, but refused, although the dangers of delay were pointed out. Under the usual palliative treatment the discharge stopped for a time, but recurred. About two months later the condition within the ear was found somewhat better. Operation was again urged, but was declined as before. Three months later the discharge increased again, and operation was agreed to. Examination at this time failed to reveal any signs of mastoid trouble, but the general physical condition was not so good. Temperature 99 degrees F. When the mastoid was opened the cortex was dark; the antrum, tip, zygomatic root, and several medullary spaces behind the sigmoid groove contained thick creamy pus. The bone was necrotic between the canal and sigmoid groove, down to the bulb. The posterior canal wall was removed and the typical Schwartze-Stacke operation done. A skin graft was placed over the entire middle ear cavity and antrum. All went well until the eighth day, when the patient complained of headache and photophobia and became restless. The temperature rose to 104 degrees, preceded by vomiting. The condition gradually improved for a week, with no marked variations in temperature. Several consultations were held, and irregular typhoid, central pneumonia, and meningitis were suggested. On the eighth day the child became drowsy and irritable, complained of posterior headache, and refused nourishment. After some delay in obtaining permission, an exploratory operation was performed, the writer suspecting an intra-cranial condition, resulting from the previous long suppuration. The child's physical condition at this time was poor. The bone over the sinus being removed, an incision was made an inch long, a gelatinous clot removed from the torcular end, establishing a good current from this direction. The bulb was then curetted and some firmer clot removed without establishing a flow of blood. The jugular vein was, therefore, resected together with several enlarged glands. The patient's condition was good at the end of the operation, but he never regained consciousness, and died twenty hours afterward. No autopsy. The author had since had two other cases with a similar history, in which early operation resulted favorably. He was unable to say whether or not any other intra-cranial condition existed in the case detailed, but if so, it was obscure. There were no chills or chilly sensations to suggest sinus involvement.

In conclusion, the writer sounded a note of warning in atypical cases against delaying too long a search for the cause in the original focus of infection, when the patient did not progress well.

Discussion:—Dr. Edward B. Deach agreed with the author that a good many of these cases ran an atypical course. He reported some time ago a case very much like the one narrated in which there was a low temperature. He had never seen a case of acute thrombosis with low temperature. He had seen cases in which the sinus had been exposed and obliterated as the result of a previous inflammatory process. Nature had looked after it and apparently he had to deal with an aseptic clot, with complete obstruction of the sinus. He had come across one or two cases in operating for acute mastoiditis.

One point which interested him was with reference to the advice given to patients with suppurative otitis media. He agreed with Dr. McKernon that, as a general rule, these cases must be operated on. There were certain exceptions, however, and he was afraid some had been a little too hasty in recommending immediate operation. He had in mind a case which came to him with an acute exacerbation of chronic suppurative otitis media. What was needed was to relieve the acute symptoms. He said to the patient that an operation was imperative for the relief of the chronic suppuration which had existed before. The patient's general condition was fair. Ten days after she came to him, with acute symptoms, he operated upon the chronic condition. The operation was absolutely successful. She was not on the operating table more than an hour and a half. The cavity was lined with epithelium and he felt perfectly safe. Within three days thereafter she died from pneumonia. He thought his judgment would have been a little better had he allowed her more time to recover from the acute attack rather than urge immediate operation. He thought it was dangerous to wait, and that was the reason he advised immediate operation. This case illustrated in a striking manner how careful one must be not to urge too early operation.

There was another question that came up, namely, the age of the patient. He recalled a woman, 67 years of age, who had had suppurative otitis media ever since she was six years of age, and he had been rather strongly urged by the patient and relatives to operate. She had a good free opening in the tympanic vault, but the tympanic membrane was destroyed. There was free drainage of both the malleus and incus. In such a case his advice was to keep the ear clean and not operate unless acute symptoms developed, for the reason she probably would not live more than four score years, and if she had had this trouble for sixty years, she would certainly be able to go thirteen years more without any trouble. He might be wrong in his judgment, but to operate on every case of chronic otitis media because there was suppuration was unwise. He believed, however, the majority of cases should be operated on, and the only way a large proportion of them could be relieved was to do a radical operation, with entire destruction of the tympanic cavity, opening the mastoid antrum, middle ear and external canal, and lining it with skin. In people of fifty and sixty years of age, who had had this trouble for many, many years, and the discharge from the ear was not undermining their health, a good deal could be done for them by keeping their ears in a sanitary condition, and one might allow many of these patients to go on as they were rather than subject them to an operation, which, although it was but slightly dangerous, possessed an element of danger the same as any other operation.

Dr. Frank Allport said a very large majority of the cases of chronic otitis media ran a certain course for years, especially if subjected to good local treatment, and nothing very serious occurred in a large proportion of them. When one was called upon to advise as to what the patient should do, he was in a position to give the advice without any hesitation whatever to submit to an operation. Nevertheless, cases of this kind gave us an opportunity to preach to ourselves and to our patients as to what was the average course to pursue. What advice should be given in the vast majority of these cases? Dr. Dench's remarks were *apropos.* One had to be governed by the circumstances and conditions of the case. Perhaps there was scarcely a gentleman in this room who would not give some advice similar to that given by Dr. Dench to an aged person with regard to operating upon a quiescent chronic purulent otitis media. Nevertheless, at the present time the profession was steadily becoming more and more, from year to year, confronted with the problem as to what could be done in these cases. A very large majority of them were not tympanic in their nature nor tubal.

Most of these cases had their pathological supply from cavities that were back of the tympanum—the hiatus, antrum, and in many cases the cells themselves, although in the majority of cases he had operated on the cells had not been very much involved. Provided trouble was there, and it was in most cases, it was known that it was beyond the reach of ordinary methods. We could not reach the aditus ad antrum and cells by the ordinary treatment, with syringing, cleaning, powdering, and drying, and even by the treatment that the president of this association (Dr. Norval H. Pierce) advocated in many cases of acute middle ear trouble drainage treatment. We could not get at the trouble by this treatment. It was beyond our reach, and therefore, it seemed to him that in not advocating operative procedures in the average case, after the disease had run a reasonable length of time, six or eight months or more, under good treatment, and had not yielded, we were not pursuing the proper course. He considered it good advice to say to these patients in the vast majority of cases that they ought to submit to a radical operation. This was certainly the course that was advocated in all other fields of surgery. Not for one moment would a general surgeon allow necrosis or pathological tissue to exist in other portions of the body without advising its extirpation, and he did not see why otologists should go on treating these cases by syringing, cleaning, drying, etc., when it was known that such treatment could not possibly reach the real seat of the trouble. All realized that many of these cases were kept in a reasonably quiescent condition. Some remained healed for an indefinite length of time if there were good drainage, if there were no obstruction to drainage of the ear, but even then, if the pathological supply was situated in the mastoid portion of the temporal bone, where it lodged in a position where it could not drain out, the conditions were such that ordinary treatment could not possibly reach them. While he did not believe in the wholesale advice that all of these patients should submit to operation, he thought the members of the profession should have the courage of their convictions, and they should advise in the vast majority of cases that these patients undergo a radical operation.

Dr. Robt. C. Myles said Dr. McKernon had presented the report of an interesting case, which was worth more than a hundred successful cases. The accessory sinuses and middle ear were always surprising the members of the profession.

He had often asked otologists, but never received any answer, as to what percentage of middle ear suppurations were fatal. In what percentage of cases was it absolutely essential to carry out operative procedures? A large percentage of these cases got well of themselves. What was the percentage of risk attending operation? As we advanced and became better acquainted with the anatomy of the mastoid process and surrounding parts, and as we became accustomed to removing these parts, liberating the confined pus and removing pathological conditions, operation was becoming more and more safe, and he thought the essential points in regard to operation were a thorough study of the anatomy and acquaintance with the method by which we removed the cortex and the parts that lay between the external surface and the part we were endeavoring to get at. He would admit that those who were extremely conservative were swindled out of many operations. But did it pay them? In the last few months he had treated some twelve or fifteen cases of otitis media, with the classical symptoms of involvement of the mastoid. Tenderness was complete. He resorted to incision of the membrana flaccida and drum membrane, there being a complete opening in nearly all of them. The patients recovered.

A short time ago a little girl was sent to him by her friends. He delayed her case a short time. Her rectal temperature was taken twice, and it never went above 99½ degrees. A mastoid operation was performed ultimately, and the bone over the lateral sinus had become diseased. She had beginning sinus thrombosis; the membrane was inflamed. He removed the bone cavity over the affected area without destroying the periosteal attachment of the bone. She recovered. The point he made was that by waiting two or three days more he would have lost the patient, and it would have been better to have operated on the other patient than to have lost this one. If one did not enter the cranial cavity, he thought the results in these cases in ninety-nine out of a hundred would be good.

Dr. A. Logan Turner said that when he asked Dr. McKernon in a conversation what was a chronic middle ear discharge, he did not mean to suggest for one moment that he was not justified in doing a complete radical operation in the case reported. Should a complete mastoid operation be done in cases which had only discharged for seven months? What was the time limit between a subacute and a true chronic otorrheal discharge? He would like to get an answer from men of the experience of Dr. McKernon in this work. He would himself say we were justified in allowing a case to discharge for a year before we were finally forced to do the Stacke-Schwartze operation. He was interested in this subject because of having had the case of a child under his care in whom there were no rigors, hardly any elevation of temperature, and he removed a portion of the jugular vein in that case.

In regard to the remarks made by other gentlemen concerning the percentage of fatalities, this was always an interesting subject; also in regard to the age of the patients. Up to thirty years of age the intra-cranial complications were much more frequent, but after that age they were very much diminished. The older the patient became, the less the risk of these intra-cranial complications.

Dr. Norval H. Pierce said that the vast majority of cases of jugular bulb thrombosis were not found in the chronic cases, but in the acute ones, say within the first two or three weeks of the beginning of the disease, and after that, within six months of the development of the process. In fact, it was rarely found in chronic suppurations of the middle ear.

Dr. McKernon, in closing the discussion, said he had very little to add except to say that a low temperature did occur in jugular bulb thrombosis. The cases which he reported two years ago were watched from the onset of the disease; they were operated on, and a clot taken from the jugular bulb and sinus. The patients made good recoveries.

During the past year he had seen one case in his own practice, and one in the practice of a colleague, in which there was a continuous low temperature from the onset. There might have been a high temperature previous to the time the patients came under observation. But if so, that was the only elevation of temperature. The case was not watched before coming under his observation. While this was not at all the rule, he believed there were a number of them attended by low temperature. In his case the clot was well organized.

He had been misunderstood in regard to advocating operation on every case of purulent discharge from the middle ear. He did not. One of the requirements he made was that when dead bone was present he would operate. He did not wish to be misunderstood in regard to that point. If one found on first examination, after he had cleansed the canal and middle ear, bringing to his aid the probe, diseased bone—he did not mean exposed bone—he believed it was the duty of the otologist in every instance to advise operation. He should lay the matter distinctly before the patient or family, and if they did not wish an operation performed, let them accept the responsibility of the future outcome of the case. If one simply said to them, this case might go on for years without giving much, if any trouble, they would quote him always as saying that, and if the case should end fatally, he was blamed by the whole family, relatives and friends. He did not wish to be misunderstood in regard to that point. Only when dead bone was found present upon examination would he advocate operation. Under no circumstances would he advocate an operation simply for a purulent condition without dead bone being present.

There was another point referred to by Dr. Dench. If one found dead bone present upon first examination, he was very apt to find it present throughout treatment. There might be a covering over of the exposed bone, and one might find the necrotic process quite as distinct several months after examination as when he first saw it. In the case reported drainage was poor. There was a large opening when the case was first seen for the tubal entrance in the middle ear, which subsequently became closed, but the opening on a level with the short process was still present. There was granulation tissue present, which protruded through the opening, and this was evidence of intra-tympanic caries in a case of continued suppuration.

If he understood Dr. Myles correctly, he spoke of the percentage of risk attending these operations. He did not think there were enough cases collected to give any definite data in regard to that. In a collection of something over four hundred and sixty cases of purulent disease of the middle ear, data which he collected himself, seven per cent of that number had intra-cranial complications.

Regarding Dr. Turner's question, as to what comprises a chronic condition of the middle ear, he would simply repeat what he stated in a paper read before the association last year, namely, given a case of purulent disease of the middle ear, with or without treatment, that had lasted six months, he should classify it under the chronic stage, and he thought one was justified in so doing.

Dr. Turner's remarks in reference to the number of intracranial complications which took place in these cases were true, the larger number of them occurring under thirty years of age. As these patients become older, they bore resistance much better, as the cavity of the bone through which the disease had traveled was thicker and longer, and in some instances the virulent condition of the poison became somewhat eliminated before it reached that stage.

Dr. G. Hudson Makuen, of Philadelphia, read a paper entitled:

What the Larygologist May do for the Correction of Some of the More Common Forms of Defects of Speech.

The author, after dwelling upon the growth and expansion of the work of the laryngologist, rhinologist, and otologist, continued by saying that they had neglected a field which seemed to him to be of great importance. He referred to that of defects of speech, the treatment of which had either been entirely neglected or relegated to quacks. The medical man should do all in his power to suppress quackery, both in the interest of suffering humanity, as well as in his own interest. It had been estimated that there were over three hundred thousand stammerers in the United States alone, and this was only a small portion of those having some form of defective speech. Every one of these cases, in his opinion, was a proper subject for medical supervision, and he thought that these disorders of speech should come within the domain of the laryngologist, rhinologist, and otologist, and that defects of vision were scarcely of more importance than defects of speech. He estimated that the exciting cause in ninety-eight per cent of all cases of stammering might be looked for in a morbid condition of some portion of the respiratory tract. Adenoids, enlarged turbinals and chronic rhinitis were causes of stammering. The laity and some physicians thought children would grow out of speech defects, and, therefore, they become nerve habits before any treatment was given. The author explained why children stammered, and he also explained his treatment, which consisted in the removal of all physical obstructions to normal respiration, and in the teaching of physiological breathing and the elementary sounds used in language. Digestive disturbances should be corrected, tobacco and stimulants of all kinds interdicted and the nervous system supported by nourishing food and plenty of sleep. A little mental science must be wisely mixed in with the treatment, and suggestion always played an important part. He had found the use of hypnotism of immense value as an adjujvant in certain selected cases, and he emphasized the importance of syllable speech. There were forty-four elementary sounds used in language, represented by the letters of the alphabet. The articulation of a word was a combination of two or more elementary sounds arranged in their proper sequence, and a syllable was a combination of elementary sounds which might be given with a single respiratory impulse. Words of two or more syllables should have as many impulses as there were syllables. Stammerers should be taught to speak, and as far as possible even to think, in syllables.

DISCUSSION: Dr. Max A. Goldstein said there was one feature about the paper which he thought might bear further elaboration, one the author touched on, but did not develop as much as he did the local manifestations and their remedy, and that was the actual cerebral deficiency or difficulty encountered in speech defects in the stammering and stuttering form. Of course, this touched the question of defective development not only of speech in its central origin, but also the sight and hearing. In a number of cases with which he had come in contact lately, these features had borne a close relation to one another. He found that in the development of the speech faculty of such a patient that the general education of the child, both as regards defective hearing and defective sight, must be considered and given training.

Dr. Hanau W. Loeb said that the essayist had for some years been endeavoring to bring before the various laryngological associations this subject in such a way that it would be better appreciated, not only from the standpoint of what could be done for these patients, but also from the standpoint of what the laryngologist could do and should do. He had brought before the association in a very succinct way general rules and observations which were to be observed in connection with the attention which these cases required, and he thought really, after all these years of work, it was high time for the profession to take more interest in the subject and aid him in developing this work, taking it out of the hands of those who were incompetent.

He thought hardly anything could be added to the somewhat elemntary consideration of the subject as presented. He did not quite fully agree with the author with reference to respiration. If he understood him correctly, he stated that on account of a lack of proper respiration there was an accumulation of carbonic acid in the blood which interfered with speech production. This would be a difficult thing to prove. It was known that the respiratory center was stimulated by a lack of oxygen. If the number of respirations were not sufficient to carry off carbonic acid, they were not sufficient to supply the requisite amount of oxygen, and the consequence would be that the respirations would be increased in frequency and the supply of oxygen heightened. Unless the author had ample proof, he would be inclined to differ from him in that particular.

Dr. Price Brown was pleased to have heard the paper because it brought to his mind a case that recently came under his observation. A clergyman, who had been preaching for ten years, had tried his best to improve his vocalization, but often found it impossible to sound the vowels separately. He thought the difficulty would be with the consonants, but these he could sound very well. The clergyman came to him with the idea that possibly some nasal or throat operation might remedy the defect. He examined the throat and found several adenoids. These he removed, not with the expectation that their removal would have any effect in improving his speech. However, very soon after the operation the patient was able to sound his a's and i's distinctly, but had difficulty some times in sounding his o's, and would make great effort to do so. However, after due time following the removal of the adenoids, he could sound his vowels as well as his consonants.

Dr. Makuen, in closing the discussion, replying to the remarks of Dr. Goldstein, said that he did not go into the psychology of stammering particularly, although he thought the cerebral conditions had more to do with stammering than with some of the other forms of defects of speech. There were some stammerers who did not know they stammered. There were some forms of defective articulation in which speech was unintelligible and the person did not know that there was anything peculiar about his speech. This was a curious thing. Each one of us had peculiarities of speech. A man with very defective articulation often times did not know that it was defective until his attention was called to it. It satisfied his own ear and his own mind, and that was sufficient. Mental expectancy was often an immediate cause of stammering, and he mentioned hypnotism as a possible means of removing this condition.

The relation of hearing to the various forms of defects of speech was interesting. They were closely related. He had a little child under his care, five years of age, who never spoke at all until about a month ago. The child heard the sounds of music, enjoyed opera and concerts, but did not know the meaning of the sounds of speech. The child should not interpret words. Such a child must be taught the meaning of words just as a baby learned the meaning of words. The child was not deaf except for speech.

With reference to the remarks of Dr. Loeb concerning the effect of carbonic acid upon the circulation of the brain, he would say that he mentioned it as one of the possible causes for the aprosexic condition so often found in stammerers. The stammerer often did not think properly, and therefore, could not speak properly.

Dr. T. Passmore Berens, of New York City, read a paper entitled:

Multiple Chronic Sinusitis Operated Upon by the Maxillary Route.

The author reported a series of fourteen operations through the maxillary route, with empyema of the maxillary antrum, ethmoid cells, and sphenoid sinus. The operation which he described in detail was performed as he saw it carried out by Jansen, of Berlin. Following the description of the fourteen cases, Dr. Berens concluded with these remarks: To summarize, all of the patients but one had disease of the sphenoid sinus; in twelve of these, occipital and vertical pains were present; in eight—all with sphenoid disease—the pains extended also into the face and were neuralgic in character, while in four cases pains closely simulated tic douloureaux. These cases were all cured except two, namely, case twelve, which was malignant, and case nine, in which suppuration returned several times in the sphenoid, each return being marked by an attack of "tic." It seemed to the writer that the presence of pain in the vertex and occiput or in trigeminal neuralgia when accompanied by pus in the posterior nares was symptomatic, almost diagnostic of sphenoid disease. In twelve of the patients there was pain in the region of the eye, especially in the region of the inner canthus. This pain was explained at the time of operation by the finding of disease in the most anterior ethmoid cells. In all of the cases excepting case five, there was a total absence of frontal sinus disease; and since they all were chronic cases, most of them of many years' duration, it was interesting to ask, what factor was present to preserve the frontal sinus from the primary infection, to cure it if it was infected, or to protect it from subsequent invasion by the disease already established in the ethmoid region? Were the teeth the prime factors of the infection of the antrum, with a subsequent extension of the the suppurative process upward and backward into the ethmoid cells and sphenoid sinus; and, if so, why, again, did the frontal sinus escape? In eight of these cases the teeth were found diseased at the time of operation, or there was a clear history of diseased teeth, at least of dentalgia. That diseased teeth caused many cases of antrum disease was not questioned, but, on the other hand, the writer believed that many a tooth had been sacrificed when proper treatment of the antrum would have saved it. A tooth having roots protruding into a suppurating cavity, the roots protected by only a thin mucous membrane periosteal covering, could readily become diseased by contiguity of tissue; and the writer maintained that in some of his cases this actually had taken place, at least to the extent of producing dentalgia. In all of the cases excepting Case 12 and Case 9, there was a complete and permanent relief from pain following the operation. Of the nine cases operated upon more than a year ago, four had had a return of pus. Two of these cases were in the ethmoid region, and were cured by subsequent curettement; one was malignant, and one was in the sphenoid. The continued suppuration in the latter case was probably due to a prolongation of the sinus into the wing of the sphenoid bone, or some other similar condition. The return of pus in the ethmoid region was the result of fear borne of inexperience of perforating through the internal plate of the ethmoid. Experience having given a better technique, the cases operated upon later had practically a complete exenteration of ethmoid cells, and had not since suppurated. There had been a troublesome crust formation in four cases; but there was an atrophic process present throughout the whole of the nasal cavities before operation in these patients. The tear duct was cut off in at least half the cases, but this had caused no symptoms, the duct simply emptying higher up. Arterial hemorrhage deep in the wound was easily controlled by artery forceps in three cases. The possibility of hemorrhage in this locality certainly demanded the most open kind of a wound that it was possible to secure in any operative procedure that might have to be undertaken. In any of these three cases the hemorrhage would have been practically beyond control had the operation been performed by the intra-nasal route.

In conclusion, the operation as described was advised only after a careful study of each case, and where the hope of a cure by milder measures could not be held out to the patient.

Discussion: Dr. Robert C. Myles said that no one hailed with greater pleasure and delight any progress in the treatment of diseases of the accessory sinuses than himself, and he had always tried for many years to do radical work with conservatism. There were many things that occurred in this class of cases that astonished us sometimes. One of the most remarkable things was the relief of pressure upon the venous circulation from operations in these cases; that is, in the return of blood to the heart. In removing the median wall between the nose and antrum, he had noticed a marked improvement in the condition of the ethmoid and sphenoid sinuses. In the so-called polypoid state, by extensive exsection of this region, after operation there seemd to be a sympathy between the different parts. Frequently the frontal sinus was involved, and a radical operation over the antrum, removing the median wall, would cause the frontal sinus to get well. Why, he could not say. But here had been a remarkable improvement in the ethmoid and frontal sinuses without cutting out the ethmoid cells. Thorough removal of the ethmoid cells was questionable in his mind. He had never seen it done. The ethmoid cells were quite extensive; they extended up into the frontal sinus above the orbital cavity; they extended behind the orbit, posterior and external to the sphenoid cell. The expression "through removal" of the ethmoid cells was frequently used, and after having removed half a dozen there were many left. He did not think it would be considered safe to remove them all. If a number of them were removed it was sufficient.

He had never had the opportunity of studying these cases through the antral route before and after operation. He had removed the median wall of the antrum or a part of the inferior turbinal through the antral route. He had thought it well to remove whatever he desired through the nasal region, and he had not had the experience the author had had to form an opinion that would be worth much. He could not understand how the author could do with a sharp curette what he said he did. He had tried it often; he had curetted thoroughly parts of the ethmoid, and every time the curette would dangle about. It was slippery, and he had to use forceps or rongeur to remove the fragments. He had not been able to clear this field in the manner in which it was done by many operators with the curette.

The results obtained by the author were most excellent, and he thought as much of the benefit of the operation came from the removal of the tension on the circulation in the neighboring parts as from entering these cavities. In many of these cases probably the frontal sinus was involved, and that when the author removed pressure from the venous return, the absorbent lymphatics and others took up the morbific product, thereby resulting in a cure of the parts that were apparently diseased.

Dr. A. Logan Turner said he had had no experience with the operation described by the author of the paper, consequently he did not feel competent to discuss it. However, after the author's description of the operation, he congratulated him upon his success. When he got back to work he would certainly do the operation in the first case that was suitable. We ought to cure patients if we could, and he expressed the belief that this was possible; but what always seemed to him unpleasant was this large permanent opening between the nasal chamber and the antral chamber. He wondered whether the author could predict what the future of these patients would be in regard to taking colds, ordinary catarrh, whether there was risk of these patients getting their colds, as it were, in their opened up antra rather than in their nasal cavities.

Dr. Chas W. Richardson said there was one point in the paper little understood, and that was with reference to packing for three or four weeks. The speaker had done the operation just as the author had described it, and he had found it difficult to keep the packing in. In a case he had recently the packing fell below the uvula. He did not know what method the author adopted for keeping the packing in place. Most patients, when they had anything in the nasal cavity, drew and invariably drew the packing down into the pharynx, and if they drew it down it was unpleasant to have to remove it. So he had given up packing in these cases. He would like to know how the author retained the packing.

Dr. Berens, closing the discussion, in answer to Dr. Myles' criticism as to the use of the sharp curette, said that in his hands it was quite satisfactory. He could make as clean a wound with the curette in this region as he could in any mastoid operation. Shreds of tissue did not follow its use. He went either through the posterior ethmoid cell or through the natural opening of the sphenoid, as happened to be the more convenient, and curetted downward and outward, and he had not had any trouble in using the large curettes in breaking down the anterior wall. He saved as much of the anterior wall external to the spheno-palatine foramina as possible. If he did not do this he might get a troublesome hemorrhage, and in spite of the utmost care one might get severe hemorrhage from the spheno-palatine vessel, and this possibility was one of the strong points in favor of this operation, for one could readily control the hemorrhage in breaking down the anterior wall because of the large wound.

So far as not being able to remove all the ethmoid cells was concerned, one could take away the lateral masses, if he was careful in his technique.

All of the cases of tic he mentioned in his paper were those occurring in patients in whom there was no tension from confined pus. They were all cases that had previously been operated upon intra-nasally or through the canine fossa, one by himself and several by New York rhinologists. The sphenoid cells were open and were discharging pus freely; the ethmoids were discharging, also the antrum. An old lady, 72 years of age on whom he operated, got an attack of tic every time she had pus in the sphenoid, and there was a hole as large as a quarter of a dollar in the sphenoid. Notwithstanding this, she got an attack of tic douloureux every time pus collected there.

In regard to Dr. Turner's question, he would say that in Case 4 the patient recently suffered from a severe coryza, with a muco-purulent discharge from both nostrils, but it caused much less trouble on the operated side and cleared up much more rapidly than on the affected side. This happened in three other cases.

In regard to packing, after he took out the packing inserted at the time of the operation, he did not re-pack. As to keeping the packing in, if Dr. Richardson would insert the packing well up into the sphenoid sinus, he would catch the upper end and prevent the lower part from falling behind the uvula.

Dr. H. Holbrook Curtis, of New York City, read a paper on

The Sphenoidal Sinus and its Surgical Relationship.

This was an interesting anatomical description of the sphenoidal sinus and its anomalies, its pathological conditions, his procedure of operating and subsequent treatment.

DISCUSSION: Dr. A. Logan Turner said the subject of sphenoidal sinus disease was more or less in its infancy. Perhaps this was putting it rather too strongly, but we were still groping somewhat in the dark as to the best method of attacking it. He thought the more recent work, as exemplified in the paper of Dr. Berens, showed that we were getting more into the general line of treatment. He had been impressed with the German literature on sphenoidal sinus suppuration, and by the apparently enormous number of cases which German physicians had under observation. One was not able to diagnose this condition in all cases. Certainly, one's experience was such as to make him believe that sphenoidal sinus suppuration was very common.

He would like to hear from Dr. Curtis and others as to what the percentage was of sphenoidal sinus disease they met with in their clinical practice. The time was coming, if it was not already here, when we should look for a collective investigation of all sinus work. He had sometimes thought of taking the matter up himself, taking the time and opportunity to get from all of the rhinologists of the world an expression of opinion as to the number of cases seen by them, the chronicity of the cases, the method of operating, the results, the fatalities, relapses, the successful cases, the non-successful cases, then we would have valuable data and know where we were and would get some idea as to the best methods of dealing with cases of accessory sinus invasion.

Dr. Robt. C. Myles thought Dr. Curtis' plan of procedure was the one that had been usually adopted by operators. In regard to the number of cases, very frequently there was simply a discharge of muco-pus, but the cases where the periosteum had been denuded, where there was a carious or necrotic area, or where there was some process going on invading the bone and in the future would invade the brain, were relatively rarer than the other class. In that class of cases we had evidence of destructive change, perhaps necrosis or other changes in the bone, and it was imperative to operate upon them. In removing the middle turbinate and posterior end, he had taken away as much of the anterior wall as he could. The curettage had been cautiously performed. He had gone into the sphenoid sinus with delicate curettes and found the wall practically gone. He had had cases with meningeal symptoms. He never curetted extensively, and the patients had all gotten well when it seemed to him that it would be impossible for them to get well. The outcome had been a surprise to him in many cases. He could show cases of several years' standing, with a large opening in the sphenoid, that were practically normal except this large opening. The phenomena of pain and other distress were characteristic; and the secret of success was due to the large opening. These openings should be made by excision of the membranes that formed over them again from time to time. It was a simple thing to excise them.

Dr. Curtis, in closing the discussion, said he did not intend to discuss the various operations that had been described from time to time for cases of empyema of the sphenoidal sinus.

In regard to Dr. Turner's question as to statistics showing the percentage of sphenoidal sinus cases, when in Berlin two years ago he investigated the statistics given in the larger hospitals there, and found that the percentage of sinus cases in proportion to the attendance at the Berlin clinics was 50 per cent greater than the percentage we had in the largest clinics in New York. If one saw the number of patients with bandaged heads walking the wards of the hospitals there, he would realize this. Sinusitis being contagious, its frequency was accounted for very largely by the absence of fresh air in the crowded portion of the city, sleeping with windows closed, and insufficient nourishment.

The operation he described in his paper was, as far as he knew, the first one of its kind performed, and it was rather interesting to look back upon it now.

Dr. Berens reported fourteen cases yesterday, in which he made the operation advocated by Mouret and Jansen, a procedure which was only to be undertaken when there was disease already existing in the maxillary antrum, and in the ethmoidal cells. It would be an injudicious operation to undertake if the antrum was not diseased, and the ethmoid cells not already invaded. In such cases a simple opening of the anterior wall of the sphenoid would be all that was necessary.

In opening the sinus from the region of the maxillary antrum, taking the route between the ostium maxillare and palatal bone, one would be apt to infect cells not already diseased. He had not gone into that question at all, preferring to leave the subject of operation for another occasion.

Dr. S. E. Solly, of Colorado Springs, Colo., read a paper entitled:

The Treatment of Tubercular Laryngitis.

The author said that while it was true that the ultimate results of laryngeal treatment were greatly influenced by the accompanying pulmonary disease, yet what could be done by wise topical treatment over and above the general treatment was shown by the following statistics of cases treated in Colorado. Taking the results in laryngeal cases without considering the ultimate fate of the patient, there was permanent arrest of the local disease in 64 per cent; temporary arrest in five per cent additional cases, in which latter the tissues again broke down shortly before death. Looking at the ulcerated cases alone 50 per cent healed permanently, and ten per cent temporarily.

After giving the reasons why laryngeal tuberculosis should be treated to its fullest extent, the author considered at length the pathological conditions.

As to the treatment, the first essential was to place the patient under the best hygienic conditions, especially under the open air treatment in a good sanitarium. The second was a change to a good climate of which the preferable elements in their order were dryness, sunshine, cool air, and a high altitude. The third essential was local treatment by an experienced laryngologist.

Discussion:—Dr. Frederick C Cobb said that in the surgical treatment of tubercular laryngitis he had removed portions of the arytenoids and curetted pretty thoroughly, and by so doing it had been frequently possible to prevent further invasion of the larynx by the tubercular process. He thought the necessity for operating on laryngeal tuberculosis in a climate which would give the larynx a chance to get well was important. It was not easy to operate on cases of tuberculosis of the larynx, and several times he had seen adhesions form between the inflamed surfaces, an objection which should be considered. In removing portions of the arytenoids it was found that the tuberculosis was sometimes so deeply situated that no amount of climatic conditions or any medicinal agent would have any effect on the process.

In regard to the injection of lactic acid, which Dr. Solly recommended, he would try it. In Boston, if the patients were unable to go away, he had found lactic acid very beneficial in the ulcerative cases, and even in some of the more recent forms of the disease it seemed to effect the cure of the pathological process, while in edema it seemed to have little or no effect.

Dr. Price Brown supported what Dr. Solly had said in regard to the open air treatment of laryngeal tuberculosis. We at the Western Hospital treat all cases of tuberculosis of the lungs by the open air method, and why should not this treatment apply equally well to those cases in which the disease involved the larynx? They should be treated in tents, winter and summer.

As to local treatment, he endorsed everything the author of the paper had said. If one had patients in a fair condition of health who could come to his office daily, he could treat them with lactic acid. His plan usually was to wash out the pharynx with an alkaline solution, then apply a five per cent solution of cocaine to the larynx, which was followed immediately by the application of 50 per cent lactic acid to be applied every second or third day. Under this treatment the larynx usually clears up, the ulceration passes away, and the patient improves.

In cases in which stenosis of the larynx was sufficiently marked to produce danger to life, and in which the lungs were not materially affected, he believed in tracheotomy. In one case of tracheotomy he reported last year he found so much infiltration of the larynx that the man's life was threatened. This man had worked all the winter with a tracheal tube in his throat. The first half of the winter he worked four hours a day with it, and the second half eight hours a day. He remarked last year that the epiglottis was gone, and the ventricular bands were bound down by adhesions. The larynx was closed too much for him to breathe easily, and he did not try to expand it for fear of auto-infection. He thought the disease had entirely disappeared. The man's temperature was normal; pulse in the morning normal, and in the evening slightly accelerated. He had not had the slightest rise of temperature since. No cough. He had worn a tracheal tube for a year and a half, and had worked for the last six months steadily.

Dr. Arthur G. Root said that if one did his full duty to cases of laryngeal tuberculosis, he must carry out the suggestions laid down in the paper. Lactic acid stood as the first remedy in this disease. So far as anesthesia of the larynx was concerned, prior to the use of lactic acid, he believed that cocaine when combined with adrenalin gave the best results. He thought the adrenalin acted much better when combined with cocaine, and the cocaine when combined with the adrenalin.

Dr. Price Brown had emphasized an important point, namely, laryngeal rest. Some time ago the speaker received a letter from one of the New York hospitals asking him for data regarding a certain man whom they had in their wards, whom they said when he presented himself, had worn a canula for some time, and that he had operated upon him some years previously. He looked up the hospital records and found it was an unusually interesting laryngeal case. The man was a marvel in physique. When he stripped him and went over his lungs he was perfectly surprised. The man had great physical strength, and apparently laryngeal tuberculosis had disappeared. He was a butcher by occupation. He operated on him for laryngeal stenosis due to tubercular infiltration. The man got well and was able to do anything he desired to do. He traveled all over the country, amused himself and raised a little money by throwing tobacco smoke through the canula and other things. When two or three years afterwards he examined his larynx, it was very much better. The process had become arrested by laryngeal rest. It might seem radical to say that a case of laryngeal tuberculosis was cured in which there was pulmonary tuberculosis.

Dr. J. A. Thompson said that one of the most important statements in Dr. Solly's paper was in the beginning, namely, we could prevent most of these severe laryngeal complications if the patient came early and the larynx was systematically treated before the stage of ulceration. The fact was general practitioners in Cincinnati had come to recognize the importance of this, and he was treating the larynx in many of their cases with beginning pulmonary disease, and the percentage of cures from combined treatment was large, even in cases where one would expect a fatal result. A patient with ulceration of the larynx was not necessarily doomed. He could recall one case still living who had a tubercular ulcer in the larynx twelve years ago.

His method of treatment to prevent infection in these cases was a little different from that outlined by Dr. Solly. Dr. Jonathan Wright had shown that the direct invasion of the larynx was possible from the sputum if the larynx was acutely inflamed. If there was no acute inflammation, there was no direct invasion from the epithelium. By the systematic use of tracheal injections it was possible to greatly diminish the amount of expectoration and to render it much less virulent. In these cases his method consisted of daily injections, or injections every second or third day, depending on the severity of the case, into the trachea, using either menthol, camphor, creosote or guaiacol sometimes combined. One could prevent extensive inflammation in this way even in cases where the pulmonary disease was carrying the patient on to a fatal result. In cases in which the cough was so severe that the patients were restless and got no rest at night from incessant laryngeal tickling, one could control the cough, tickling and irritation for four to eight hours by one injection, giving the patients a chance to retain their meals and sleep at nights.

He had tried to impress upon the general practitioner the importance of beginning laryngeal treatment early and systematically, and by so doing he could prevent the severe lesions that were the cause of the indescribable suffering in tuberculosis of the larynx.

Dr. Chevalier Jackson corroborated what had been said regarding the beneficial effects of tracheotomy in primary tuberculosis of the larynx, in which there was absolutely no pulmonary involvement. He had at home three patients who were wearing tracheal canulas, every one of whom got much better after tracheotomy. In every case in which the larynx was affected tracheotomy would help materially on account of the degree of rest which it afforded the larynx. He used to be skeptical in regard to this. The respiratory movements of the larynx went on very much the same whether air passed in and out or not. There were associated muscular movements which went on even when the air current did not pass through, yet a certain degree of rest must take place, for clinically there was much less irritation. Tracheotomy as a prelininary measure made the radical treatment of the larynx safe. The lactic acid treatment was undoubtedly of great value in cases of laryngeal tuberculosis; yet when there was stenosis and edema of the larynx the patients could sleep much better if they wore a tracheotomy canula, besides its beneficial influence. He had seen cases of laryngeal tuberculosis get well, when other practitioners doubted it was really tuberculosis, and he had felt a little skeptical about it himself. He exhibited one such case before the Section Meeting in Pittsburg. Dr. Phillips, Dr. Pierce and others saw the patient. Dr. Phillips said, before looking at the case, he never saw a patient with laryngeal tuberculosis get well, and after examining the patient he repeated the statement. So he presumed that Dr. Phillips doubted the correctness of his diagnosis. There was absolutely no lung involvement in the case, and yet there were tubercle bacilli in the sputum. If there were any lung involvement, the finding of tubercle bacilli in the sputum would have been of very little importance. The patient had lived seven or eight years since her case was diagnosed as one of laryngeal tuberculosis by the late Dr. Daly and himself, and was still well, although deformity of the larynx existed, and the epiglottis was "mouse-gnawed."

Dr. Robt. Levy said that every now and then one heard from men throughout the country regarding the advisability of mild measures, and of the great detriment done to patients by radical measures. It was gratifying to hear the gentleman agree with Dr. Solly relative to the radical treatment of laryngeal tuberculosis. We were apt to get into a rut. He thought the pendulum was now swinging in the other direction. In a disease, which offered so little hope in many instances, radical measures had always appealed to him as the most desirable to adopt, especially in view of the fact that less radical ones offered absolutely no hope, either in palliative or curative attempts.

The site of the ulceration was a very important point in determining the method to be followed. He was sure, we all saw ulcerations in certain situations of the larynx that went on from bad to worse, leaving the patient absolutely no hope of recovery. On the other hand, ulcerations situated in other portions of the larynx offered every opportunity. It had been his experience that in those cases in which the ulcerations attacked the epiglottis and aryepiglottic folds, or as pointed out by Bosworth many years ago, the nearer one came to the outer air, the less the possibility of cure. In these cases the results were less gratifying than when the ulceration was situated deeply in the larynx, the ventricular bands, or the posterior commissure.

As to the existence of chronic laryngitis, he agreed with the author, that hygiene of the upper air passages, including the nose, pharynx, nose-pharynx and larynx was of great importance; not that these cases of chronic laryngitis in tubercular individuals would degenerate into tubercular laryngitis, but that there was a pathological condition of the upper air passages which afforded an excellent site for the development of tubercular lesions.

Dr. Solly, in closing the discussion, said they got a great many cases in Colorado that had not been treated along these lines. One of the chief difficulties was they had been treated too long and inefficiently, and when they came to them they were afraid of undergoing serious treatment. Patients had not been prepared for it, and one of the important things for physicians to learn was that when they got hold of a tubercular larynx to work hard to try and make the patient well. It was absolutely necessary that patients should learn to submit to any measures that were needful to accomplish that purpose. One should not take away hope, but tell patients they must have treatment.

Rest was very important. Opening the trachea was followed by a remarkable subsidence of the acute symptoms in many cases, and the patients sometimes lived for many years. Of course, this procedure was only admissible in extreme cases.

Dr. Brown referred to the use of lactic acid. Lactic acid even on an unbroken surface had usually good effect. As a rule, in these cases it was best to use the lactic acid well diluted, thus causing absorption through the mucous membrane, which was better than cauterization with the strong acid.

What Dr. Thompson said about early treatment was most important, and he thought it would be a great thing if the general practitioner realized the importance of getting his cases of laryngeal tuberculosis examined and treated by specialists as early as possible. People were frightened about their throats when they had chronic laryngitis, and when tubercular invasion had gone on for some time, it was not easy to tell what it was.

There were a great many points touched upon in connection with syphilis and tuberculosis, about the danger of stenosis, which Dr. Jackson spoke of, etc., but these did not come under the head of such cases as he had been referring to.

One of the reasons why the curette had fallen into much disrepute was because so much wholesale butchery had been committed with it in the past, particularly in using the double curette. Certainly tracheotomy was sometimes a very desirable procedure before proceeding to other methods.

He agreed with Dr. Levy that the locality of the disease largely determined the prognosis.

Dr. Joseph A. White, of Richmond, Va., read a paper entitled:

Mastoiditis.

The author reported a case of this disease, which was complicated by nephritis and erysipelas, at great length. The case presented some interesting points. First, the long continuance of the temperature changes. Second, the disappearance and recurrences of the suppuration. Third, the kidney complications, and especially the suppression of urine so long after the operation. Fourth, the development of erysipelas simulating sinus infection.

The author reported the case in great detail because some one else might have had a similar experience.

Discussion:—Dr. H. Holbrook Curtis stated that in December of last year he had a similar case to that reported by Dr. White. The patient was a woman 62 years of age who had albumin with granular and hyaline casts in her urine before operation. She was operated on for mastoiditis in December. The operation was followed for four days by a temperature of 103¼ degrees, after which the temperature dropped, and on the eleventh day was normal. The patient was then attacked with erysipelas, with a temperature of 105 degrees, which lasted from the eleventh to the twenty-first day, after which time the erysipelas had entirely disappeared. As soon as the erysipelas had cleared up, she passed fifty ounces of urine. The next day, however, there was suppression, which lasted two days. Hypodermoclysis was resorted to under the breast on one side, and over the abdominal wall on the other. The day following hypodermoclysis, although the action of the kidneys had been reestablished, both areas of infiltration were erysipelatous, and she died four days afterwards.

Dr. R. C. Holmes reported the case of a boy, twelve years of age, who had been under observation for several months prior to coming to him. There had been made three Wilde incisions by those who previously had charge of the case.

When he saw him his face was slightly edematous, waxy in appearance, and the boy looked very sick. He was admitted to the hospital, and urinalysis showed the urine loaded with albumen, and contained large quantities of blood and casts. Looking into the history of the case, and conversing with the family physician, he elicited the statement that prior to an ordinary acute otitis media on the right side he was in perfect health, and that the albuminuria had developed in the course of the disease. He had been in the hands of a good man, but Dr. Holmes was informed that on account of the excessive albuminuria he did not desire to do the operation. The speaker, however, made the radical operation. The boy did splendidly. The anesthetic did not affect the kidneys, and he was progressing nicely. There was a slight diminution in the amount of albumen and blood. The wound was healing rapidly. Patient then developed a purulent otitis media on the opposite side, which necessitated opening the antrum (not doing the radical operation). The kidneys were so seriously involved that the boy finally died, although the ears up to a short time before death did quite well. Death was due to Bright's disease.

Dr. Edward B. Dench said, after listening to Dr. White's paper, that there were one or two points to be borne in mind. The urine should be examined previous to operation. It was his practice to do this in every case in which he thought it was going to be necessary to perform an operation, and in a number of instances (he could not say how many) brought into the hospital there had been some albuminuria, but that was not a contra-indication to operation in many cases. The action of the anesthetic might have had something to do with the albuminuria, and he had given chloroform rather than ether sometimes to prevent any congestion of the kidney in these cases.

The question as to whether a mastoid abscess could be secondary to a kidney lesion was rather far fetched. Of course, if one had a focus of pus in the kidney he might have a secondary mastoid abscess, the same as a secondary abscess in any other part of the body; but to consider the mastoiditis as dependent upon nephritis, except in a general way, was far fetched.

As regards the prognosis in cases in which albuminuria was present, he had never seen them do badly. It was true, convalescence might be prolonged, but he did not think these patients necessarily would do badly if they withstood the operation.

Some of the features in Dr. White's case were interesting, and he (Dr. White) probably struck the key-note of the trouble when he said that some of the cells in the mastoid might have been overlooked at the time of the first operation. Practitioners were very apt to overlook some of the cells lying in the zygomatic process. He had seen a number of cases in which the invasion of the zygomatic cells was started from pus, and in the deeper zygomatic process there were a few drops of pus. The same thing was true of the cells overlying the lateral sinus.

He had had erysipelas develop in quite a number of mastoid cases, one in private practice, and it had developed in hospital cases more than once. The patients, however, had invariably done well. He recalled one death from erysipelas occurring in a mastoid case. The curous part of it was that it did not seem to make much difference how extensive the wound in the mastoid had been or the exposure. In one case in particular, wher the sinus was exposed to the extent of an inch or more during operation, the man developed erysipelas. In his early practice he felt much worried that he would have to expose the sinus. This man developed streptococcus infection in his superficial structures, but recovered. So, after all, erysipelas in cases of mastoditis did not seem to be a very fatal complication.

Dr. Henry L. Myers said he had a case of acute mastoiditis in a young woman before coming to the meeting. She had suffered an attack of la grippe. She had a slight chill, some temperature, and developed earache. The earache lasted four days before she came to him, at which time he found it necessary to resort to paracentesis. The next morning, tenderness not having diminished, he opened the mastoid and found pus in the antrum and in the tip. The next morning she was doing well. The following day, however, she showed a great deal of jaundice, and vomited continually; temperature rose to 101 degrees, and she seemed a little dull in mind. The next day she was delirious; did not know any one; temperature 101 degrees; pulse 120. He examined her urine and found it full of albumen. Her family physician thinking perhaps she might have had some malaria beforehand, blood tests were made, but the plasmodia was not found. The leucocytes were 12,000 or 15,000. She was in this condition for 24 hours, then she began to clear up. All her symptoms passed away as rapidly as they began. On the fourth day she was entirely herself, and her condition seemed to be normal. The question arose as to whether her urine was involved as a result of the mastoiditis, or whether she had previously had albumen in her urine. Personally, he was inclined to take the latter view. The possibility of a mild serous meningitis should also be considered.

Dr. Chas. W. Richardson said it was as necessary to find out the cause as the fact of invasion of the middle ear with mastoiditis. The administration of the anesthetic might have been sufficient to cause the disturbance in the kidney, for if the urine was examined in these cases shortly after these operations a high degree of infection of the kidney would be found.

With regard to erysipelas, he had seen it in probably half a dozen operated cases, and he had been interested in regard to the mode of infection. One of his assistants called his attention to it, and he thought the probable source of invasion was through the excessive scrubbing of the skin. He had noticed that the infection began about three inches or more from the seat of the wound, either in front or back, so that he was inclined to believe that infection took place through the excessive scrubbing of the skin in these cases. In the last year or so he had resorted to such thorough scraping of the skin with hair brushes that he had not had any infection. He had in the last year had three cases, had followed each one, and did not have a death from erysipelas. Erysipelas had not given him much concern. He had had it follow operations, but never infected the wound, and patients had all done well.

Dr. White, in closing the discussion, said that his paper was read for the purpose of eliciting discussion. He was very anxious to hear the experience of others, and to know if any etiological connection could be drawn between nephritis and mastoid disease. He had drawn no conclusions himself, but had simply offered suggestions for discussion. It seemed to him, however, it was perfectly sensible to conclude in the presence of nephritis that the course of mastoid disease must necessarily be more or less complicated or prolonged, with the possibility of a relapse and a long convalescence because the system was lowered in its vitality. The whole condition of the patient was reduced by nephritis. The ordinary normal resistance in pyogenic cases was impaired, and the healing process must naturally be delayed.

He thought Dr. Dench would have opened this sinus sooner than he proposed to do it, but that was the difference between New York and Richmond. In New York they did not hesitate to operate in such cases with the slightest indication for it. He had to be more cautious in his community. He had suggested mastoid operations not once or twice, but a great many times when the operation had been declined, and in nearly every instance the patient got well without having the mastoid opened. In New York, in all probability, every one of these would have been operated on; in fact, the numbers operated on there seemed so large to him that he once asked Dr. Dench if they did not keep a breeding establishment for them. The fact that so many had declined the mastoid operation and gotten well without it convinced him that operation was performed in too many cases. For instance, the very patient above reported recovered without opening the sinus, and had been well for four months.

Dr. W. S. Bryant, of New York City, read a paper entitled:

Tinnitus Aurium, and its Treatment.

The author discussed local treatment only. This was found to be the same as the treatment for deafness with few exceptions. Many of these arose because the disturbance was of more delicate nature than that causing a loss of hearing alone. It, therefore, required still greater care in manipulation. Too energetic treatment might tend to increase rather than decrease the symptoms. In a large proportion of cases the sound conducting mechanism was at fault, and required treatment more than any other defect in the complicated condition which gave rise to the tinnitus. Neurectomy had been tried in cases of grave tinnitus, with unsatisfactory results, owing to the poor technique employed, and the selection of improper cases. Further attempts would undoubtedly develop a comparatively safe and sure method. Treatment in objective tinnitus was chiefly directed to lessening the sounds, and later to dulling the patient's perception of them. In subjective tinnitus the local treatment was chiefly directed to lessening the perception of the tinnitus by the ear, and the improvement of sound conduction; secondarily, to lessening the sounds themselves. Most of the tinnitus under this head was dependent upon pathological conditions of the mucous membrane of the Eustachian tube and tympanum, which were themselves dependent on like conditions in the naso-pharynx. The treatment was worked out on the lines required by a classification of the varieties of tinnitus, which the author submitted.

Dr. William C. Bane said he presumed the author of the paper left out quite a good deal in reading it, as in speaking of the use of the galvanic current he did not mention the strength of the current. The speaker thought this was important.

Dr. C. R. Holmes said the subject was one of great importance. He was sorry the author was obliged to skip so much of his paper on account of the limitation of time. He should certainly look forward to reading the paper carefully when it was published.

Dr. Alfred B. Duel said, if he understood the essayist correctly, he stated that in cases in which tinnitus persisted, in spite of efforts to relieve it, he would advise operation for complete deafness. As a matter of fact, nearly all cases which were encountered that had chronic catarrhal deafness had marked tinnitus, which was never completely relieved. He would like to ask the author if it was his intention in all these cases to render the patient deaf by relieving the tinnitus, or in such cases in which the tinnitus was pronounced, did he expect the patients to become insane.

Dr. Bryant, in closing the discussion, said in regard to the remarks concerning the use of electricity, he used the galvanic current, and where one uses the larger electrode in the pharyngeal end of the tube, he could employ as much current as the patient would stand without any bad results.

In answer to Dr. Duel's question, he would like to say that in some cases in which the tinnitus was very severe he would not hesitate to recommend the radical removal of the auditory nerve. The idea was that in cases in which the noise was very great, disturbing the patient mentally, and where insanity was threatened, it was worth while to take any risk. In many cases the tinnitus might be only a slight inconvenience.

Symposium of Malignant Growths of the Upper Air Passages.

Dr. Frederick C. Cobb, of Boston, read a paper entitled:

Malignant Growths of the Nose and Naso-Pharynx.

The author referred to the several classes of malignant growths of the nose and naso-phyranx.

It was an interesting question whether benign growths might degenerate into malignant ones, as had been claimed. The evidence was conflicting. No case had been found which distinctly proved such hypothesis.

Many of the sarcomata occurred in the young in whom polypi were very rare. Most of the members had undoubtedly removed the polypi from the same persons for many years in succession, and he could not find any cases of malignancy resulting in his own practice or his friends. From a clinical standpoint he believed that the presence of sarcoma and malignant growths had been an accident rather than a degeneration.

Sarcoma of the nose manifested itself usually in a dark red polypoid mass, bleeding easily when touched with the probe. The pedicle of this growth was broad and thick, while the texture of the polyp was soft and friable. Secretion, when ulceration sets in, might be purulent and often offensive, or there might be no odor and very little secretion.

The diagnosis of malignant growths of the nose might be divided into three classes:

1. Diagnosis between malignant or benignant.
2. Diagnosis between different forms of malignant disease.
3. Diagnosis of malignant from tubercular and syphilitic lesions.

The prognosis of malignant growths in the nose and nasopharynx was almost universally bad under all forms of treatment known at present.

As to treatment, removal by intra-nasal method as a palliative measure might be advised where some indication prevented operation by a more radical method. Where such method was resorted to the galvanic-cautery wire loop was probably the safest instrument, although the cold wire snare, if carefully and slowly used, might be recommended. The success attending major operations, such as excision of the jaw, was very far from encouraging, yet operation might be resorted to as a forlorn hope, or to relieve the urgency of some of the symptoms. There always remained a faint possibility of success, although the prognosis, even with the most radical operations was extremely doubtful. These tumors usually extended far deeper and higher in the nasal cavities than was supposed before operation, and any operation recommended should be the one giving access to the greatest extent of nasal tissue.

Where the growth was bilateral, Ollie's operation, which consisted in sawing through the nasal bones and turning the nose forward upon the face, gave one a very clear view of the ethmoid region and upper portion of the nose.

No operation should be done without careful consideration as to whether the patient could stand the severe hemorrhage which was likely to result.

Dr. M. A. Goldstein, of St. Louis, Mo., followed with a paper entitled:

Malignant Growths of the Mouth and Pharynx.

The author spoke of the importance of early diagnosis, after which he illustrated the value of prompt operative interference by reporting an interesting case of epithelioma of the tongue.

He discussed the favorable conditions of the pharynx for the development of malignant neoplasms; also the organs involved, the character and frequency of the neoplasms, etc.

The differential diagnosis was discussed at great length.

With regard to therapy, he said there were but two courses of treatment open for consideration at the present time. First, the X-ray and radium treatment. Second, the radical operative removal.

The X-ray and radium therapy were still so much in the experimental stage, that definite results could not yet be recorded. If the brilliant possibilities for the use of such a therapy be realized and the numerous preliminary reports of remarkable improvements and cures could be substantiated, then the X-ray and radium light would offer an ideal solution of this grave problem. Until then we must content ourselves with radical excision and dissection of the involved tissues and of all adjacent structures which threatened metastasis.

Enucleation of a faucial tonsil alone even in the earliest possible stage of malignancy was not sufficient to safeguard the patient against recurrence. Radical surgery was indicated.

As to the prognosis, one should be encouraged by the records of the past two decades, all of which presented substantial evidence of the cure of a larger percentage of cases of malignant neoplasms in every portion of the body. This might properly be credited to the more radical forms of operation, and the greater proficiency in early recognition of cases.

Dr. D. Braden Kyle, of Philadelphia, Pa., gave a brief discussion on:

The Pathology of Malignant Growths of the Upper Air Passages.

Before proceeding to discuss the pathology of malignant tumors of the respiratory tract, the author desired to say a word or two in defense of the microscope. One of the members at a previous session spoke disparagingly of microscopic examinations, because of the different diagnoses received on specimens which he had submitted for examination. In the first place, a great deal of fault in diagnosis lay with the clinician, who might in a case of doubt simply remove a small piece of tissue and send it to the microscopist for examination. Now, if the microscopist was not also a clinician, the report would be faulty, for the clinical data should always be considered. One could not possibly by the microscope alone differentiate between a small round cell sarcoma, an acute inflammatory condition that was partially organized, an inflammatory area around a specific or tubercular lesion, and many other processes, simply by examining a few sections taken perhaps from a small area of the diseased tissue. He might write out exactly what he found, but deductions should be drawn only from thorough examination. The best microscopist was the man who was also a good clinician, who associated all phenomena observed in the patient with the microscopic findings, and on him we could rely. To condemn a miscroscopic examination because of the faults of some one who had misused it was unjust.

Malignant tumors of the upper respiratory tract were either sarcoma, the connective tissue type, or carcinoma, the epithelial type. The confusion which might at times result from the fact that we had certain benign tumors which became the seat of malignant growths might be thus explained. For instance, we might have a benign tumor of the connective tissue type or of the epithelial type, fibroma being an example of the former and a papilloma of the latter class. Take adenoma, for instance, which gave a reproduction of the gland structure; it fell short in one thing, and that was physiological function. This tissue was of low grade and through irritation predisposed to a malignant condition, whether it be carcinoma or sarcoma. Papilloma occurred at the junction of the skin and mucous membrane, or it might occur at the junction of a fold of mucous membrane. These locations, naturally subjected to irritation, would tend to produce carcinomatous or sarcomatous tissue. One would frequently see articles in medical journals in which a benign tumor was said to have become malignant.

It never became malignant because a benign tumor was never turned into a malignant one any more than typhoid fever turned into pneumonia, although one might predispose to the other. A benign tumor at a point where it was subjected to irritation would more likely be the seat of malignant growth than if there were no tumor there, but the embryonic cells must necessarily have been there to begin with.

About the pharynx, the nasal orifice, the tonsils, the tongue, the mouth, where there were benign growths, a great many practitioners say remove them at once, and possibly in many cases this was the right thing to do, because irritation of the tumor might tend to its malignancy. He urged upon all, in the microscopic examination of tissue, to consider the early history and present clinical appearance of cases, and wherever there was breaking down of tissue, whether it be a benign growth, or one which from irritation has become the seat of malignancy, to take into consideration the advisability of its early removal from the mucous membrane.

Dr. Chevalier Jackson, of Pittsburg, Pa., read a paper on:

Malignant Disease of the Upper Air Passages.

The author said that the factors in the etiology of carcinoma were age, sex, heredity, syphilis, irritation, and precancerous benign neoplasms. The sites in the order of frequency were the glottic boundaries, the epiglottis, posterior surface of the cricoid cartilage, interarytenoid fold, aryepiglottic ligament, ventricular bands, the ventricle, and the infraglottic region. The symptoms were dysphonia, hoarseness, aphonia, cough, expectoration of frothy secretion, dyspnea, hemorrhage, orthopnea, pain, laryngeal, and referred to the ears, dysphagia, odynphagia, fetor, and cachexia. The laryngoscopic appearances might show paralysis of a cord, a more or less diffuse redness, or a protrusion appearing snow white, dirty gray, pinkish, or reddish, in form, papillomatous, warty, with sharply pointed elevations, with intervening rounded granulations, or ulcer. It might be single or multiple, and was often covered with pus or frothy saliva. The diagnosis would rest upon the age, fetor, cachexia, adenopathy, pain, duration, paralysis of a cord, palpitation of the thyroid cartilage, and the microscopic report. Syphilis, perichondritis, lupus, tuberculosis, chronic laryngitis, blood clots and hemorrhage spots, pachydermia, eversion of the ventricle, and benign growths were excluded. The prognosis as to termination was unfavorable, but not hopeless. In early operated intrinsic malignant disease it was good. In disease extrinsic by origin or extension, and when the lymphatics were infected, it was unfavorable. Prognosis as to duration, from two to ten years might be promised, if not seen too late. As to recurrence, the prognosis was the same as mentioned of termination. The prognosis as to voice in early thyrotomized intrinsic cases was fairly good; in late cases requiring laryngectomy, some kind of sound answering to speech might be promised. Treatment might be palliative or radical. Palliative measures included tracheotomy, esphagostomy (or gastroenterostomy), cleansing sprays, and gargles. Serum therapy, Finsen's light rays, Roentgen rays, and radioactive substances were not yet proved of benefit. Partial endolaryngeal removal of the malignant mass was absolutely unjustifiable, even for the dyspnea, unless consent to a tracheotomy could not be obtained.

Radical Treatment.—Unless a total removal of infection was a reasonable possibility, no operation was justifiable except tracheotomy, esophagotomy or whatever else might be planned to prevent or postpone inanition or asphyxia. Radical endolaryngeal extirpation was impossible. Radical measures included transhyoid and infrahyoid pharyngotomy, thyrotomy, partial laryngectomy, and total laryngectomy. Pharyngotomy, transhyoid and subhyoid were adapted only to disease limited to the epiglottis. Thyrotomy was the operation of election under the following conditions: 1. An intrinsic growth. 2. A limited extent of disease. 3. Malignancy. 4. Suspected malignancy (exploratory thyrotomy). 5. No involvement of the thyroid cartilages. 6. No glandular involvement. Partial laryngectomy was advisable when at thyrotomy removable malignant extension was found. Total laryngectomy, with if necessary removal of all infected glands and tissues, was indicated when the patient desired a chance of cure, with, in any event, increased comfort for a variable period, when the disease was extrinsic by origin or extension, or, though intrinsic, so extensive that sufficient surrounding healthy tissue could not be otherwise removed. Total laryngectomy with modern technique, prosthetic appliances, and the possibilities of buccal voice, was not the formidable prospect for the patient that it formerly was. Preliminary stitching of the trachea to a button-hole in the skin, the avoidance of opiates, the combined Trendelenburg-Rose position, "talking anesthesia" with chloroform, allowing the patient to "come out" before the stitches were put in, careful postoperative watching, very frequent cleansing of the canula, and keeping the patient prone after operation, all these would reduce the danger of postoperative pneumonia to almost nothing. Rectal alimentation was a delusion and a snare. Feeding should be by esophageal tube for a few days. The use of a brilliant head-lamp facilitated thorough extirpation. The curette had no place in the extirpation of laryngeal malignant disease. It rubbed in the infection, as a rake buried seed in the soil. A clean cut with knife and scissors through healthy tissue beyond the invaded area was the best method.

Discussion:—Dr. A. Logan Turner was asked to open the discussion. He said he had very little to say on the subject. It was a wide one and was open to a great deal of discussion. The discussion of malignant growths of the larynx alone would consume much time. Dr. Jackson, of course, was obliged to condense his paper in giving it, and there were many points which he was not able to put before the members. The speaker was more interested in Dr. Jackson's part of the subject because he wanted to hear what views were held on this side of the ocean with regard to the methods of operating on malignant diseases of the larynx. In England the general trend of thought and action was towards the views of Sir Felix Semon and Butlin. namely, to resort to thyrotomy in intrinsic laryngeal cancer. If his reading was correct, on this side of the ocean the tendency was towards a wider removal of the disease, and that laryngectomy was indicated and carried out more frequently, and, lastly, the operation of thyrotomy. The whole secret depended on early diagnosis, and unless one could diagnose cases of cancer of the larynx early, he could not do modified operations. He wished he had brought with him the latest statistics of Semon and Butlin on this point, but unfortunately he was unable to get them before leaving home.

Dr. C. R. Holmes said there was one point that impressed him very forcibly, and that was, from his own experience he had learned that the microscope was not always to be relied on. He thought we were all apt to cut out a piece of tissue and submit it to some one who professed to do microscopic work, and that this individual to whom the section was sent frequently gave an opinion that did not correspond with the clinical diagnosis and clinical results. This had been his experience. He had in mind one typical case, that of a prominent business man in Cincinnati, who came to him, as a last resort, for consultation. He had been advised, after prolonged observation and treatment by a good man, to have his superior maxilla on the right side removed for a malignant growth. Upon examination the speaker was not convinced that the trouble was malignant. However, he removed a piece of the growth, sent it to a microscopist, and received a report that it was sarcoma. He doubted the correctness of this report. The man was about to be married. He denied a specific history. He believed the trouble to be specific, and put the man on antisyphilitic treatment, and today he was perfectly well. This case was seen several years ago. The disease melted down promptly under antisyphilitic treatment.

In the case of a woman, about 35 years of age, a diagnosis was made of cancer of the larynx, involving the tonsils and base of the tongue. Surgeons were consulted, who advised the splitting of the jaw to remove a part of the larynx. Microscopical sections were submitted to two or three microscopists, and the disease pronounced malignant. Some said we might as well let the woman die. She was rather frail in physique. The speaker resorted to G. Betton Massey's method of electrolysis, and the case was now apparently well. There were still small remnants of the growth, but it had been reduced nine-tenths in size. Whether the findings of the microscopists were right or wrong, he was still in doubt. Had he followed the dictates of the microscopists, a radical operation would have been made at that time. He saw this woman only a short time ago, and seemingly she was perfectly well, although it was about five years since he first treated her.

He thought Dr. Jackson took too firm a stand against nutrient enemata. Last year his mother, aged 74, died of obstruction from cancer of the stomach. She received absolutely nothing but nutrient enemata for over two and a half months. She would have the sensation of hunger at hours when the enema was due and it appeared practically as satisfying to her as an ordinary meal. She was well nourished, and continued so almost to the last, but there was such absolute occlusion that not a drop of water would pass through the stomach, and it was from thirst and finally general exhaustion, but not especially from lack of nutrition, that she died. He did not think one should take such a strong view against the efficacy of nutrient enemata as Dr. Jackson had done.

Orbital Infection from the Ethmoid Cells, with Spontaneous Opening at the Inner Angle of the Orbit.

Dr. Carl E. Munger, of New York City, said, in studying the literature of orbital abscesses involving the ethmoid region, it was apparent to him that the number of cases recently reported was much less since the rhinologist had been developed, and our knowledge of intranasal diseases had increased and intranasal surgery had become more nearly perfected. This was undoubtedly due to the earlier diagnosis made possible by more extended information as to ethmoid diseases, and the greater promptness with which the ethmoid region was attacked surgically. Cases of orbital infection from the ethmoid cells occurred, as was evidenced by the report of such cases. Most of the examples of this occurrence were chronic in character, coming on early after a long duration of ethmoid trouble, but with notable exceptions, *i. e.*, as in a case reported by W. N. Hubbard, in which the orbital abscess came on shortly after a case of tonsilitis, probably of influenzic origin in a patient with no previous history of ethmoid involvement; and a case reported by Milligan, where an ethmoiditis followed a severe attack of cold in the head, and this in a short time followed by the appearance of an orbital swelling in the region of the inner canthus. The case reported by the essayist was not unlike those previously reported.

Discussion:—Dr. Knapp thought the subject of orbital infection secondary to ethmoid disease was very important, as it was one of the most frequent complications of ethmoid disease, and as far as he had been able to judge these complications could be divided into two classes. In the first class there was no perforation of the bony wall, while in the second class there was perforation of the bony wall. In the first class, usually cases of acute ethmoiditis, he had seen collateral edema of the orbit producing exophthalmos, with congestion of the eyebrows. In this class the symptoms were relieved by intranasal treatment of the ethmoiditis. The second class of cases, in which there was perforation, could be divided into the acute and chronic. The acute cases led to the formation of abscess which tended to perforate anteriorly, as in the case just reported. In the chronic cases an enormous abscess sac developed between the periosteum and the ethmoid labyrinth. The most serious complication he had seen following this had been sudden and complete blindness of the eye on the affected side, the ophthalmoscopic picture simulating that of embolism of the central retinal vessels, and the only way it could be explained was that it was an acute arteritis of the retinal vessels in the form of embolism.

The treatment in the cases he had seen in which perforation had occurred, either in the acute or chronic form, had been a little more radical than that described by Dr. Munger. He did not think drainage alone was sufficient treatment for these cases because we were liable to have a relapse. A radical operation was indicated in most of them.

Dr. J. A. Thompson said that a confusing point in the diagnosis of these chronic cases was illustrated by a patient he saw four years ago in consultation with an oculist. He was asked to examine the patient after preparations had been made for the removal of an orbital tumor. The history was that when a child, three years of age, he had a severe case of scarlatina. From that time until he saw him, nineteen years later, he had never breathed through the corresponding nostril. But no attention had been paid to this. The patient lived on a farm out in the country. When the ocular symptoms developed, he was brought to the hospital in the city and placed under the care of a colleague. The morning the speaker saw him the left eye was at an angle of 45 degrees. There was some conjunctivitis; some weeping from the corresponding eye, but no active inflammatory symptoms. Pressure over and around the orbit elicited a little expression of pain, and the feeling was that of a bony tumor. He was utterly unable in the nasal examination to pass a probe through the nose back to the naso-pharynx in any portion of it. There was some adhesion between the septum and structures of the outer wall, and no amount of cocaine or adrenalin could enable him to find the opening. He told the oculist who had the case in charge that he thought it was one of ethmoid abscess that had pushed the orbital plate of the ethmoid in front of it. Arrangements had been made for operation. He went ahead and made a free opening into the nose. He found, when he entered the orbit, he was unable to get any pus until he perforated the bone, and then the discharge was free. The after results were a troublesome part of his operation. The operation wound would not close, and some two months later the case was brought to the speaker for intranasal operation, with the hope of getting the fistulous opening at the upper part of the orbit closed. He never undertook so hopeless a job. There was absolutely no landmark by which one could recognize the normal structures. All he could do was to go in and remove granulation tissue, with spicules of bone lying in it. To make a long story short, he made three operations before he succeeded in getting the nostril patulous, and in securing a perfect cure. The eye returned to its normal condition, and the young man was able to breathe through the nostril, although there was an adhesion at one point.

Dr. T. Passmore Berens thought the treatment of these cases could be summed up in three words—radical but careful. Unless one was radical in the removal of the ethmoid cells, the case would continue to suppurate, and one would get a condition described by Dr. Thompson.

Dr. Munger, in closing the discussion, said he had nothing to say except to remark that a radical operation in some of these cases was necessary. He did not think, however, it was indicated in his case. The patient got well, so that he saw no further occasion for operating.

Adenocarcinoma Occupying all of the Sinuses, Nose and Orbits.

Dr. W. H. Dudley, of Easton, Pa., read a paper on this subject, and presented a pathological specimen. The patient was 63 years old, with a history of the previous removal of palypi from nose and nasopharynx, and presented himself with disease of left maxillary antrum, and exophthalmos. Antrum and orbit were cleaned out, but growth soon returned, and continued to involve one sinus after another, until the whole anterior portion of the head had become one mass of adenocarcinomatous tissue. Microscopic sections of polypi removed early were simple adenoma, but all sections examined after the operation to relieve the exophthalmos were adenocarcinoma. The case was under observation over two years, and during this time the Rontgen ray was used for several months, which resulted in relieving the pain (which was never very severe), and reduced somewhat the size of the tumor, which, however. grew rapidly as soon as this treatment was discontinued. An examination of the bisected specimen showed practically none of the osseous framework of this part of the head, except the sphenoid and frontal bones, and a portion of these was also absorbed. Several photographs were presented, showing the appearance of the case at different stages of the disease.

Dr. Arthur B. Duel, of New York City, read a paper in which he reported:

Cases Illustrating Difficulties in the Diagnosis of Mastoid Complications.

Ordinarily extension of a suppurative process from the mastoid to the adjacent structures is accompanied by unmistakable symptoms. Even though all the typical symptoms are not present, the surgeon is led to operate in an exploratory way early rather than hesitate, the exploration of surrounding structures not being difficult with mastoid cells removed. The author presented three cases to ilustrate the difficulty arising when a concomitant disease is present or developing, in determining whether changes of temperature, pulse, respiration, and alteration in blood are due to aural extensions or other remote causes. In one case, the chart and general aspect pointing to a developing sinus trouble, a diagnosis of pneumonia was made by the consultants; the patient recovered with the diagnosis left in doubt. In the second case, indefinite chest signs developed directly after the operation; a distinct broncho-pneumonia had been present prior to the mastoiditis; in spite of the picture being unlike that of a sinus thrombosis, the author removed a diseased sinus and jugular—being inclined to explore by the fact that they could not find sufficient signs in the lungs to account for the temperature.

The third case, a child, was operated on for a cervical adenitis complicating an apparent catarrhal otitis. During the ten days following, the temperature remained on the 100 line, when a post-aural swelling appeared. A mastoid was performed, and patient made an uneventful recovery.

Dr. Jas. F. McCaw, of Waterbury, Conn., read a paper on:

Mastoiditis.

He cited four interesting cases of this disease. The first was one of acute suppurative otitis media, mastoiditis, subperiosteal mastoid abscess, peri-sinus epidural abscess, which was operated on, with recovery. The second was one of acute suppurative otitis media, double mastoiditis; operation and recovery. The third was one of acute suppurative otitis media, mastoiditis; operation and recovery. The fourth, acute suppurative otitis media, mastoiditis, epidural abscess; operation and death.

Diseases of the Salivary Ducts and Glands and their Treatment.

Dr. Robt. C. Myles, of New York City, pointed out the diseases commonly associated with these organs, and reported five instructive cases. The points of interest that were taught by the histories of these cases were:

1. That it was necessary to make a thorough test of every known method, in order to make a correct diagnosis in a suspicious case.

2. That the removal of these calculi could best be accomplished by surgical procedures, preferably through the floor of the mouth.

3. That it was always well, when possible, to probe and dilate the duct, and thus establish and maintain the normal flow of the salivary secretion.

DISCUSSION:—Dr. Geo. L. Richards had had two cases. A man, a fish dealer, had an intermittent discharge from the right side of the mouth through the sublingual duct for some time, which became purulent and sero-purulent, after which swelling occurred, with involvement of the sub-maxillary gland. Patient stated to his physician that some years ago he stuck a piece of straw into the duct while cleaning his teeth. Everybody laughed at him as no calculus could be felt. The condition of the patient became so serious and the swelling so great, that Dr. Richards finally dissected out the submaxillary gland and in getting into the anterior part of the gland found a good sized calculus, and after sawing through the calculus found the offending straw. This was the nucleus around which the entire trouble originated. The removal of the calculus was followed by an entire cure. He never heard the patient say anything in regard to the very annoying lack of moisture in that side of the face. He asked Dr. Myles if the parotid still remained on that side, whether there would still be insufficient moisture of the mouth.

Dr. Myles thought the man might have been depressed from long treatment and the dryness under the tongue might have affected him.

Dr. Richards said that in the other case, in which there was swelling of the tongue, on probing he did not find any calculus, but on slitting the parts up along the line of a small director, and going about an inch and a half downward, he found a calculus, removed it, and healing occurred.

Uses of Rubber in the Treatment of Nasal and Antral Diseases.

Dr. Price Brown, of Toronto, Ont., said there were many cases of nasal disease in which, although the passages might be sufficiently open to permit of nasal respiration, yet owing to accumulation of secretion while sleeping, the mouth dropped open, and oral respiration was the result. In consequence of this, the dry air entering the pharynx absorbed the moisture exuded by the superficial glands for the lubrication of the mucous membrane, and chronic pharyngitis and laryngitis were the results. For the last twelve years the author had endeavored to remove this cause of oral respiration by the use of rubber mouth pieces, made of pure sheet rubber, about an eighth or a twelfth inch thick. A piece was cut to fit the cavity of the mouth between the teeth and lips. The latter were closed over it, hiding it from view, and when worn, oral respiration became impossible, the patient being forced to breathe through the nostrils. One great advantage of all these rubber appliances was that they could be easily made by the surgeon.

Discussion:—Dr. Geo. L. Richards said, in regard to the treatment of antral empyema, he failed to see why one should drain through the mouth when he could do so underneath the inferior turbinal in these cases. In the cases spoken of by Dr. Brown, one could make an exploratory incision underneath the anterior end of the inferior turbinal; he could enlarge this with various sized curettes, and then take the second size of Dr. Myles' forceps, and get a space of three-quarters of an inch, which would not close, and which would drain the antrum into the nose. By so doing, the patient was not subjected to the annoyance of a band of rubber against the teeth. He had found that this method gave rapid and permanent results.

Dr. Robt. C. Myles stated that for ten or fifteen years he had experimented with these different processes. He published several cuts of soft rubber tubes which he used for quite a while, but as time went on he found better methods. He had patients who for ten or twenty years had suffered from post-nasal catarrh, and they would never permit their antra to be closed up again. He had a patient who, for the last six or eight months, had washed out his antrum and continued to do so every time he washed his face. If one could get free drainage and free admission of air, in many cases the antral conditions would get well of themselves without too much surgery.

Dr. James E. Logan said, in regard to the rubber splint that Dr. Brown used in the operation for deflection of the nasal septum, it had been his practice to discontinue the use of any rubber (vulcanite) tube or apparatus upon the septum, for the reason he found in these operations, when one corrected the deflection of the septum by whatever means he adopted, the natural inclination in the healing process was for the septum to return to its otherwise deflected position. Constant pressure was needed, more or less, and for that purpose he used a modified plug. If the plug was pressed, or a modification of the Simpson plug fitted the aperture which one wished to mould, the use of this compressed plug exercises constant pressure which brought about success. It was much better than the use of something which was not so elastic, and caused nothing in the way of counterpressure which was exerted by the hard rubber or metallic splint.

Dr. Price Brown, in closing the discussion, said that he did not wish to emphasize this method of treatment above all others. As stated, the case he had was that of an old man too much debilitated to justify him in undertaking a more radical operation, and he thought the treatment he carried out was simpler. In all probability, one might have had more effective drainage by other means in the case he reported, but he did not expect his patient to recover, and succeeded in putting in a tube very easily for washing out purposes. The method of treatment was unusual and the result a cure.

With regard to the use of the splint, the benefit of it came from the constant pressure it produced. The reason Dr. Logan did not receive benefit from it in his cases was because he did not use it long enough. It did no injury. It produced no sepsis. It loosened because the septum became rigid and shrank back from the splint. The septum, so far as his own case was concerned, remained in position without changing. The use of the splint was much better than the other methods he had tried.

Dr. Edward B. Dench, of New York City, read a paper in which he reported a case of acute suppurative otitis media, which was complicated by a double pneumonia and septic thrombosis of the jugular bulb. The author resorted to excision of the internal jugular, which was followed by general systematic infection and death.

Discussion:—Dr. Kasper Pischel, of San Francisco, asked what Dr. Dench's experience had been with anti-streptococcus serum in the treatment of these cases.

Dr. Dench replied that this was the only case in which he had ever used the serum, and the result was not very good.

Collodium After Nose Operations.

Dr. Kasper Pischel, of San Francisco, gave a demonstration of the use of this agent, after which he stated that two years ago he published an article on this subject. At the meetings of the German Pathological Society and the London Largyngological Society last year, the question of the operative treatment of the nose was discussed, but the method which he suggested was not mentioned. He thought it was an oversight, as such things must be seen in order for one to appreciate their value.

The after treatment in nose operations, on the septum as well as on the turbinals, had been quite unsatisfactory to him. There was the alternative to pack the nose or take the risk of having a severe hemorrhage. To have the nose packed was very disagreeable to the patient. If the packing was loose, one might have a hemorrhage. If the packing was tight, it sometimes caused such discomfort and pain that patients could not sleep. He tried different kinds of packing. Iodoform gauze strips soaked in ferro-pyrine solution answered tolerably well. A surer packing against post-operative hemorrhages was compressed cotton in the form of Dr. Simpson's intranasal tampons, made by Johnson & Johnson. The moisture of the nose made them swell up so that they very effectually prevented hemorrhage, but the pressure was sometimes so great that it caused pain, discomfort, and a sleepless night. The removal of the plug also was quite painful, and several times he overlooked some layers which were pressed into the cleft; they stayed there several days, causing some infection through the retention of pus. These disagreeable experiences caused him to look for a cover of the wound which would not close up the nares. He tried carbolized gelatine in 50 per cent solution, which had served him well in small hemorrhages of the septum, but it did not prove strong enough. For the last ten months he had used collodium, to his entire satisfaction. After he was through with the operation (removal of hypertrophy on the lower turbinal, for example), he touched the wound several times with adrenalin to stop the bleeding; then he dropped collodium on the wound, while his assistant blew compressed air into the nose to quicken evaporation. The collodium quickly formed a white, firm membrane which fulfilled two purposes. It covered the wound against infection from the air and prevented secondary hemorrhages. As an extra precaution, he asked the patient to keep a little cotton in the entrance of the nose on the way home, but allowed him to take it out at home, so that he might breathe through that nostril. In several cases, to facilitate the sticking and to increase the power of collodium, he put a wisp of cotton on the wound first: after a few days he removed this membrane, which, if left too long, might cause infection by retention. He had now used collodium in thirty-one cases, and had not yet had one secondary hemorrhage. At first he was afraid that collodium would smart too much, but as the nose was under cocaine anesthesia the patient did not feel anything. The collodium must be dropped on the wound slowly and carefully, so that it will not run down into the pharynx, which would make the patient gag and cough. For dropping the collodium on the wound one might use a fine eustachian catheter, on the wider end of which a small rubber bulb (of a dropper) was mounted, fastened air-tight with a rubber band. One filling of the bulb with collodium was usually enough to cover the whole wound. He used a small metal tube, 9 cm. long, 1 mm. thick, with a tulip tip on one end, to fasten the rubber bulb. This tube had to be cleaned out thoroughly after use.

Discussion:—Dr. Chevalier Jackson, in the discussion, said he thought this was a most excellent procedure. He had seen Dr. Day use a similar method for years without a dropper, but this was a technical improvement on that method. After drying it off, he saturated a pledget of cotton with collodium and put it in with forceps, and left it in three, four or five days until it loosened itself and came away of its own accord. Secretions did not seem to penetrate it, nor to rot in it.

Dr. Joseph C. Beck asked if any gentleman had ever used glutol after operations on the nose. If any of the members would try it, they would find its fixity almost as firm as mouldine, and it was aseptic. General surgeons used it on laparotomy wounds, and had left them undisturbed. The wound was as clean as could be. Glutol dried out the surface, and that was what they used it for. There was no odor accompanying it. It was better than bismuth or any of the agents usually employed, and it would soak by means of a very warm solution. If one had to loosen it up and use considerable heat in so doing, he might start oozing. He had used glutol with satisfaction. He applied it with an applicator. He moistened the applicator, removed the excess, and the glutol was dried sufficiently to make a coating over the surface. If the surface was far enough anteriorly, one could use a blower.

The Relation of Diseases of the Stomach to Affections of the Mouth, Nose and Throat.

Dr. Robert Levy, of Denver, Colo., in a paper with this title said that a careful review of laryngological literature impressed one with the fact that while there existed a relation between diseases of the upper air passages and those of the stomach, this relationship was not well defined, nor was the interdependence of diseases of the stomach and those of the mouth, throat and nose separated distinctly from affections of the gastro-intestinal tract, and, in fact, from those of the entire digestive system. Many diseases of the mouth, nose and pharynx and accessory cavities resisted treatment directed purely to the relief of the local conditions until measures intended to correct general disorders were instituted. Three positive statements might be made clinically:

1. That certain affections of the upper air passages and their adjacent cavities were causative in a measure of some form of stomach disturbance.
2. That certain stomach disturbances were the cause of certain affections of the upper air tract.
3. That the relationship existing between digestive disturbances and certain diseases of the upper air passages was so close that treatment must necessarily involve attention to both conditions.

Although no direct causative relation could be traced between diseases of the alimentary canal and certain affections of the mouth, they might be and frequently were associated. Among the diseases of the nose, which were more especially associated with gastro-intestinal affections were vaso-motor rhinitis, nasal irritation and red nose:

Urticaria of the mucous membrance of the throat was a serious and might possibly be a fatal affection, and was largely dependent upon digestive disturbances, as was well known to be the case in urticaria of the skin. Among diseases of the larynx, certain nervous affections, such as hyperesthesia and laryngeal spasm, were found attended with disturbed digestion. Although diseases of the stomach could not be said to be indisputably caused by affections of the mouth, nose and throat, or indisputably the result of diseases of these organs, the correlation was so close that successful management of both depended largely upon recognition of this interdependence. This still further emphasized the thought, to which men working in special lines had called attention, that the entire human organism was one intricate mechanism in which local disorders were frequently but manifestations of constitutional affections.

Discussion.—Dr. J. A. Stucky was very much interested in the relation of naso-pharyngeal disturbances to gastro-intestinal trouble. Undoubtedly, the gastra-intestinal canal had a good deal to do with the nose and throat. Cases of so-called vasomotor rhinitis and of lithemic naso-pharyngitis, he believed, in a measure, had their origin in the intestinal canal, and in the last two years he had been making some observations in connection with a stomach specialist and microscopist, and found those patients that were sneezing, blowing, hawking and spitting lived a rather indolent life. Most of them were big eaters, great brain workers or society people, who had the handkerchief habit, who complained of rheumatism, general malaise, and were neurotics generally. In these patients he found the urine loaded with indican. His attention was first called to this by Dr. J. McClymonds, and in 123 examinations of the urine in cases such as he had described and read about at the Pittsburg meeting, he found an excess of indican in the urine; occasionally an excess of uric acid, but the uric acid found did not cause as much of the irritation as the presence of indican. He did not know anything about indican. It was said to be the result of absorption of the intestinal contents connected with fecal matter; but he did not know this. The moment he eliminated all of the indican, the moment he got his patient's colon flushed out and the diet regulated, the sneezing and nasal disturbance stopped. Personally ,he did not believe that the swallowing of the mucus secreted by the nose and throat had much to do with gastric disturbance, but the trouble began, not in the stomach so much as in the intestinal canal, and one had to clean out the intestinal canal and get the eliminative organs working harmoniously before these patients could be relieved. If they were sent to the country they got better. And why? For two reasons: Send them to the springs, and they would drink a great deal more water than they would at home. They would take a great deal more exercise than they would at home. They went there for a purpose. They did not take as much exercise and drink as much water at home as they did at health resorts. If they did, many of them would do just as well at home as they would at these resorts. However, the drinking of fluids did not relieve the average case, and not until the alimentary canal was thoroughly emptied at both ends were they relieved. He meant by that high enema, using a thirty or forty-inch tube, the enema being given say at five o'clock in the evening, and then two or three hours later the same colon tube was used and 8 ounces of olive oil was injected. With this treatment the patient would go to sleep. If it was nine or ten o'clock, the oil was not passed until the next morning, and frequently not then unless a saline was given.

But about the second or third day one would be surprised at the enormous quantity of fecal matter that would be passed, large scybalous masses being passed, with foul odor. He did not succeed in thoroughly clearing out the intestinal canal in one case until the eighteenth day, but usually about the third, fourth, seventh or eighth day these cases began to clear up. The relief was marked. The objection to this treatment was that it required a trained nurse to give the injections properly. These patients were sent to the hospital to remain there for four or five days, if necessary, or else they were to have a trained nurse go to their home. The results of this treatment had been so beneficial and relief so great to the patients that they did not object to the treatment.

Dr. Frederic C. Cobb said his own experience agreed with what Dr. Stucky had said. There were a number of nasopharyngeal cases which seemed to be entirely dependent upon digestive disturbances; but the complications which occurred in digestive disorders were far beyond anything one could find out without special study. He had often referred these cases to a stomach specialist, and the results obtained had been much better than if he had tried to treat them himself. Cases that did not yield to cauterization and clearing of the nasal cavities very thoroughly showed a startling improvement as soon as attention was given to the gastro-intestinal tract. These cases in his experience usually had gastro-intestinal symptoms, such as dyspepsia, diarrhea, constipation, etc., and unless treatment was directed to the stomach and intestines, as well as to the local conditions, the results were not satisfactory.

Dr. Wm. L. Ballenger saw a case some years ago which illustrated one of the diseases Dr. Levy mentioned in his paper as being due to stomach disturbance, namely, acute circumscribed edema of the pharynx and larynx and of the fauces.

A young lady, living north of his place some miles, started for the city to attend a theater. When she left home she complained of slight headache. Before she had traveled more than four miles by train she began to feel a sense of suffocation, and she came to him on account of her acute symptoms of suffocation. Upon examination he found the fauces, uvula, and large portions of the lateral walls of the pharynx and epiglottis very edematous, apparently large urticarial wheels or edematous areas being present. Dyspnea was very marked. Cyanosis was somewhat noticeable; her mental distress was extreme. The first thing he did was to assure her that she was not in danger, and that if she remained calm she would soon get her breath again, and any danger would disappear. He then proceeded to scarify the edematous areas and apply astringent remedies, such as he happened to have at home, and among them he used cocaine. In a few minutes she was greatly relieved, and in a few days the edema had entirely disappeared. There was also very marked nasal disease in this case in the way of septal deformities and turbinal enlargements. Furthermore, the young lady was intensely neurotic. The affection might not have been stomach in origin, although this was quite probable, as her family physician, an able man, so diagnosed her case. He recognized urticaria in other parts of the body as being suggestive, having its origin in the digestive tract or faulty digestion, or faulty metabolism, and in this case it was quite probable it was the principal cause of the digestive disturbance. Patient had eaten largely of strawberries some hours previous to the attack. She had subsequently slight attacks of edema. He reported this case to the Chicago Academy of Medicine several years ago. His thesis for Fellowship in the Academy was based on this case. He described the case as one of acute circumscribed edema of the fauces and throat.

In general, he believed there was a close relationship in many cases between pharyngeal disease and the hyperesthetic types of rhinitis and diseases of the gastro-intestinal tract. He recognized, however, the great difficulty in establishing positive evidence to prove this relationship. Conclusions had to be based chiefly upon data rather than on any positive proof. If one would read Frederick's review of this subject, he would find that his conclusions were to that effect, that while there was a large amount of literature being written on the subject, there was little positive evidence existing to show such relationship. Clinically, however, it was very well established that there was such a relationship and it was interdependent. Some cases of stomach disturbance were undoubtedly due to nasal or throat disease, whereas in other cases the nasal or throat disease could be ascribed to intestinal diseases.

Dr. J. A. Stucky added a word or two to what he had already said with the permission of the Society. He feared that he did not make himself clear in his previous remarks. Undoubtedly in some of these cases the urticaria was due to gastric irritation. But there was one experiment he had made on four or five cases that proved something, he thought. Dr. McClymonds, a stomach specialist in Lexington, had washed out the stomach in these cases, and in many of them it was not followed by relief, as the sneezing and irritation had continued. But the moment the alimentary canal was washed out relief was afforded. He thought this proved something. One patient he had, if she drank a cup of coffee and ate a plate of ice cream, within an hour or two she had a stuffy headache, sneezing, and an asthmatic cough. On three different occasions he had had her stomach washed out to see whether the trouble was there within two hours after eating, and he found coffee and ice cream. Then a high enema was given; the lower bowel washed out, a saline administered, all of which consumed an hour. The case was perfectly relieved. In four or five other cases he had tried the same experiment with good results. His observation had been that toxemia resulted from the absorption of the bi-products from the intestinal canal, and not from the stomach.

PROCEEDINGS OF THE FRENCH SOCIETY OF OTOLOGY, LARYNGOLOGY AND RHINOLOGY

MEETING OF 1904.

(Continued from the June Annals.)

Fronto-Maxillary Sinusitis with Anomaly of the Frontal Sinus.

DELIES (Ypres).—Mlle P. suffered several months with left frontal headache with an intercurrence of painful attacks accompanied by neuralgic irradiations from the eye and left upper teeth. The patient had frontal and maxillary sinusitis. Mahu's sign showed the capacity of the maxillary sinus to be 1¾ c. c.

Operation.—Trepanation of the frontal immediately above the orbital arch in the angle made by its internal border and the median line. I came upon a completely eburnated bone which I succeeded in penetrating after digging for one centimeter. No liquid escaped. At the bottom of the wound was exposed a more or less smooth, bluish, depressable membrane, permitting easy detachment without loss of blood or fluid from the internal table.

I made a second perforation in the bone immediately above and outside the first, and with the gouge brought the two openings into communication. I then had under my eyes the same membrane, glistening and elastic; described above; it had no pulsating movement. I was convinced that it was the dura mater. A blunt probe introduced in all directions penetrated easily between the bone and this membrane, being nowhere arrested save at 1½ m. m. in the direction of the median line. No long resistance was met anywhere.

Below and behind it easily entered several centimeters without penetrating into the nose. To be absolutely sure that I was not in the sinus I punctured the membrane with the point of a knife. An aqueous fluid escaped and pulsation instantly appeared at the incised point. Before going further I protected the dura mater with a tampon of aseptic gauze. Taking my chisel I enlarged from below the perforation in the bone made at the beginning. At the second stroke of the chisel over the orbital arch, I laid bare a dull colored area, representing a solution of continuity in the bone. Pursuing my work I came upon a small cavity in the bone filled with granulations, without pus. I resected all the anterior orbital wall, covering the entire orbital arch and measuring about 2 c. m. from and 1 c. m. above the root of the nose.

Curettage of the sinus cavity. The sinus walls, both superior and inferior, were perfectly smooth and formed an acute angle about 1 c. m. in depth. The latter was lost backward and inward in the nasal cavity through the fronto-nasal canal which the curette easily penetrated. The bony wall which separated the sinus from the endocranium was of the thinness of paper. The dura mater was laid bare over a diameter of 2 c. m.

Cleansing with peroxid, immediate suture. A gauze drain was left in the lower third of the frontal incision, communicating with the endocranium, and another in the incision over the orbital arch, communicating with the sinus.

The maxillary sinus was operated upon after Luc's method. It was found studded with fetid granulations.

The results were excellent and without cerebral symptoms.

Reflections.—I have reported this case of anomaly of the frontal sinus, one of rare smallness, enclosed entirely in the orbital arch, in contrast with a case which I have formerly published, where the two sinuses were merged into a single vast cavity comprising the whole frontal area. Nothing caused suspicion of the condition—the examination of the sinus by transillumination showed extensive dimensions.

In closing, Delies insisted upon the necessity of trepaning the anterior wall of the frontal sinus and not of the orbital arch.

LUC asked if in his case it would not have been easier to find the sinus by the orbital route.

DELIES answered no, because the sinus was very anterior, almost entirely in the orbital arch.

MOURE mentioned a point to differentiate the sinus mucosa from the dura mater. When soft membrane is reached and only a single layer of dense bone has been traversed it is the sinus; if, on the other hand, compact bone, spongy bone, and another layer of compact bone are cut through, the latter is the internal table of the frontal and the cranial cavity has been entered.

DELIES.—In my case I had to deal with bone which was completely eburnated, and the point mentioned was inapplicable here.

Clinical Remarks Upon Some Cases of Frontal Sinusitis.

MOURE, (Bordeaux).—I desire to make a few observations concerning two patients with frontal sinusitis, upon whom I operated and with results scarcely favorable, especially in one case.

Case I.—A young lady, 18 or 19, with right fronto-maxillary sinusitis. At the first sitting I operated upon the maxillary sinus only; considering the neuropathic condition of the patient I was not sure of the frontal sinusitis.

In spite of the intervention the patient continued to have suppuration and suffer, and her frontal sinus was darkened. I did a second operation, upon the frontal sinus, following the classic technic of Ogston-Luc. I found a small sinus with mucocele.

I had great difficulty in finding the naso-frontal canal, because of deviations. The drainage was ample, however.

Two days afterward the pain reappeared. The dressing was removed and I found phlegmon of the orbit.

An oculist who was consulted, made an incision under chloroform into the orbit and drained it. During the next few days all the symptoms were accentuated, the protrusion of the eye was more marked, the pain greater and the cornea began to ulcerate. One morning we found indications for enucleation, but the following day the patient became better and later recovered. Unfortunately a fistulous tract persisted. I performed another operation in which I completely cleared the sinus cavity and gave free drainage toward the rear because of septal deviation. The results were excellent but not perfect, for the fistulous tract still remained. I propose to do another operation, which will be ethmoidectomy this time.

Case II.—Man of 35; headache since infancy. Double fronto-maxillary sinusitis. Exophthalmus of the left eye. General health poor.

At the first sitting I operated upon both maxillary sinuses. Cure.

At a second sitting I operated upon both frontal sinuses.

On the right I found an enormous partitioned frontal sinus, containing much pus and granulations. Seeing the large dimensions of this frontal sinus I was almost led to do a complete Kuhnt. I established a large naso-frontal canal. On the left side, after the sinus was opened, a flood of pus poured out, and I found an encysted abscess in the sinus which had pressed back the cranial walls and was forming a recess behind the orbit, having destroyed the arch of the orbit. It might be called a spontaneous Killian operation. Nasal drainage. Suture.

Some days later, the patient showed signs of phlegmon of right upper eye-lid, and while these were progressing until they had almost disappeared, he received a new infection, due somewhat to his own lack of care. No headache, no vomiting, no abnormal pupillary reactions, in short no meningeal symptoms. Some days later, however, the patient had trouble in speaking, and symptoms of cerebral abscess. He fell into a semi-comatose state. I suggested an operation, but it was refused by the family. Death.

In the first of these two instances, the subsequent incidents could be attributed to insufficient drainage, but in the second case, this was surely not the cause which produced exitus. It is true that the patient was feeble, and belonged to the category of patients, whom it is better not to touch.

I will conclude by saying that I am a follower of the operation of Ogston-Luc, which has always given me good results.

The opening in the anterior wall of the frontal sinus should not be too large but large enough to permit thorough curettage of the sinus. As to the nasal drainage its importance is very great and it should be as large as possible.

The following case is in proof: The patient was operated upon for fronto-maxillary sinusitis. After the operation I could not discover any discharge; I saw only some crusts.

Eight or ten days afterwards there was swelling and fluctuation. I incised and found the sinus filled with muco-purulent serum. I re-established communication by removing the crusts which obstructed the canal. Cure.

It may be seen by this that the question of drainage has great importance in operations for frontal sinusitis, but to establish this drainage each operator has his method. Luc passes his finger into the naso-frontal canal. By this procedure it is possible to infect the wound, the nasal fossae being far from aseptic. To avoid this inconvenience I have had constructed a cotton carrier with which I work from above downward, never from below, upward, in such a way that I do not risk infecting the sinus cavity with the material in the nasal fossae.

LERMOYEZ.—Several operations have the favor of specialists for the radical cure of chronic frontal sinusitis, the Ogston-Luc, the Kuhnt-Luc, the Killian.

The Ogston-Luc, the oldest operation, the most simple to execute, and the most elegant in its results, has the great defect of exposing the patient to recurrences, the gravity of which is sometimes extreme. While some fortunate operators bring forth statistics in favor of this procedure, it is none the less true that other unfortunate operators have been obliged to abandon it. As we know, the chance is more or less good, but not constant—sooner or later there will come to the defenders of this method the inevitable catastrophe which will modify their previous optimism; inevitable because the Ogston-Luc contradicts the general rule of surgery which seeks to avoid dead space.

The Kuhnt-Luc, if well done (and by well done I understand total resection not only of the anterior wall, but also, if necessary, of the inferior or orbital wall of the frontal sinus, as Kuhnt himself has instructed) prevents dead space and almost surely wards off recurrences. And, if there subsequently is a reinfection coming from an insufficiently curetted ethmoid, there will be no question of frontal sinusitis, for there is no sinus. But the Kuhnt-Luc has the fault of producing considerable deformity, especially if the sinus is a large one.

The Killian avoids this by preserving the border of the orbit. It reduces the consequent deformity to a minimum, but while doing this, it leaves a dead space, and consequently the possibility of recurrence slight, it is true, because of the radical clearing out of the ethmoid anteriosly which it permits.

I have recently been able to compare, with regard to recurrence, the value of the two latter procedures. Two patients were operated upon at the same time by me, one by the Kuhnt-Luc, the other by the Killian.

By accident, a gross error in asepsis was made in the preparation of the dressings. About the fifteenth day there appeared in both patients an abscess at the internal part of the cicatrix, coming from a point of ethmoiditis. Now, in the Kuhnt-Luc case the union of the frontal skin to the internal wall of the frontal sinus held good and in two or three days the angulo-orbital suppuration ceased. In the Killian case an empyema of non-effaced frontal sinus developed and it was necessary to reoperate extensively.

My line of conduct is as follows: Almost never the Ogston-Luc, usually the Kuhnt-Luc, and, if the sinus is so large that the subsequent deformity would be disfiguring, I do the Killian. However, I do not deny that this way of considering the operative indications for frontal sinusitis is imperfect. But it appears difficult to do better at present. Everyone today clings to a procedure which he applies automatically to all cases. It is desirable for us to somewhat forsake therapeusis which absorbs all our thought. Let us turn to pathologic anatomy, take a few hours from the office and devote them to the amphitheatre, and no doubt we will find in the group of frontal sinusites,, which we now tend to consider as of the same sort, various anatomo-clinical types, for each of which is demanded this or that operative procedure. Our specialty will gain by becoming a little more scientific, and our patients will benefit accordingly.

LUC.—There is no more important question of the hour than the origin of intra-cranial complications consecutive to frontal sinusitis.

I cannot give precise statistics at the moment, but in a little over thirty cases, operated upon by me in the Ogston-Luc way before systematically employing Killian's method, I had not less than five or six deaths from intro-cranial complications. The last of these unfortunate cases is particularly instructive, for death followed acute meningitis three or four days after operotion. At autopsy the sinus was absolutely clean, without any trace of pus or any retentions whatever. Defective drainage could not be invoked, the enemy was not in the sinus but else where.

Opposed to these unfortunate results I can congratulate myself upon those obtained by the technic of Killian. The last twelve patients I treated were operated by this method and I had no intra-cranial complication to regret. The superiority of the Killian lies in its thorough, complete and conscientious operation upon the anterior ethmoid cells. The disasters encountered with other methods are due to blind and incomplete curettage of this same area. Now we know how dangerous are incomplete operations upon infected bony cavities; such, for example, is ossiculectomy, harmless when the osteites is limited to the ossicles, but accompanied sometimes by grave complications when there is concomitant antritis. If the Killian operation succeeds, it is indisputably due to its free resection of the ethmoid.

JACQUES (Nancy).—As Luc said, the interest in the genesis of intra-cranial conditions following operations on the frontal sinus is great. It is unnecessary to believe that the technic of the operation is always the cause of the complication, since frequently there is no retention and the complications appear none the less. I believe that total ablation of the ethmoid is more often demanded than complete suppression of the frontal cavity. Enlargement of the canal is a foolish manœuvre. To do it well, it is necessary, as I have recommended, to make an anterior incision which will allow the ethmoid to be approached from in front. As I think I have shown by a large number of cases, it is possible by the orbital incision to make a complete curettement of the frontal sinus, without touching the anterior wall. In spite of what Lermoyes says, there need be no fear of bad effects from the dead area, since the suppression of the ethmoid makes of the frontal sinus an accessory of the enlarged nasal fossa.

MOLINIE (Marseille).—No operation, not even that of Kuhnt-Luc can prevent a return of the disease, because of the involvement of the ethmoid. It can be said that the operation of Kuhnt-Luc does not always obliterate the frontal sinus, for this result is impossible to obtain in certain cases.

LAURENS (Paris).—I am a follower of the operation of Ogston-Luc, which I have always employed, with good results. Of 35 to 40 cases,. hardly one-fourth have had a return of the condition. The procedure is an excellent operation, no matter what the dimensions of the sinus are. In case of a return, I have avoided every complication by making an immediate incision to allow the pus to escape, followed, as soon as possible, by a total sinusectomy. These cases will be the subject of a forthcoming work.

MOURE replied to Lermoyez that the fatal condition which he had related could not be used to condemn the method of Ogston-Luc, since not only had the operation been an extensive one, but the disease itself had made it a sort of spontaneous Killian by the disappearance of the orbital wall.

As to the objection of Jacques, M. replied that his first case was one of a frontal mucocele without an ethmoiditis, and consequently the fistula could not be ascribed to the ethmoiditis.

He did not believe that any operation could cause the total obliteration of the cavity of the sinus, the absence of all dead space. He therefore refused to be a systematic follower of the method of Kuhnt-Luc. When the patient recovered. it was not due to the absence of that dead space but because they had left a non-infected space.

He concluded, as last year, by saying: In cases of small sinus, the operation of Ogston-Luc; in cases of large sinus or relapse, large resection.

Frontal Sinusitis with Empyema of the Maxillary Sinus in a Woman Aged Seventy-Seven Years. Refusal of Operation. Death.

De Ponthiere (Charleroi) has systematically practiced the method of gouging recomemnded by Mahu in the differential diagnosis of maxillary sinusitis and empyema. He had only praise for it. A recent case proved to him clearly its clinical value. A very nervous patient, in whom he had made two lavages and in whom Mahu's sign indicated a simple empyema, refused to continue the lavage, and demanded the radical operation. P. did so, and after opening the sinus, showed the existence at the most of a small quantity of muco-pus. He merely cleansed the cavity and closed it. Cure.

Lermoyez.—It is not without hesitation and deep reflection that I have concluded to speak of something which has engaged my attention for a long time.

In its somewhat paradoxical appearance my idea might seem to be a return to ancient errors, which, however, is far from my thought.

We are in the habit of considering chronic frontal sinusitis as an affection seriously menacing existence, and of systematically advising our patients to be cured by operation. We are led to such a conclusion, firstly, by a consideration of the anatomic relations of the sinus; secondly by comparison with that which occurs in the suppurating ear, and lastly by the observation of cases such as those reported by Mahu.

However, are things just as we figure them? Is frontal sinusitis as grave as it is believed, and how far are we authorized in advising operation? As to the first point: Each of us has seen numerous patients, succumb to cerebral complications of otitic origin. There are, on the contrary, few cases of fronto-cerebral complication. In proof is the fact that Mahu would not have made his report if it had been a common case of cerebral fatality of otic origin.

In the second place, if we scan the observations published in the different special journals, we find few cases of fatal cerebral complication in the course of chronic frontal sinusitis. And it is curious that the number of cerebral deaths appears as great, if not greater, in the operated sinuses, than in the non-operated. Now, these approximate statistics should be true, for we all tend more to publish the history of patients who die after refusing operation, than the history of those who underwent operation and died.

In the third place we cannot exactly compare the middle ear to the frontal sinus; the middle ear is a very rebellious cavity, whose drainage is anatomically very imperfect, while the frontal sinus is, on the contrary, a simple cavity with rapid evacuation.

In the fourth place I insist upon this point. When we trephine a suppurating ear we always meet with greater lesions than we expected; in chronic frontal sinusitis, even in the course of an exacerbation, it is always a surprise for us to find other than a slight change in this region, with relation to the intensity of the symptoms. The trephined ear shows extensive bone lesions, parietal perforation, the lateral sinus, the dura mater exposed and granulated. The frontal sinus on being opened usually shows healthy bony walls, pus restrained, mucosa only slightly fungated, and that is all.

Far from my thought is it to consider frontal sinusitis as an insignificant affair and to deny the usefulness of operation. But I believe that in the clinic we ought to be opportunists and not radicals; that to tell every patient with frontal sinusitis (as in ear suppuration) that he has a mortal malady and that he must be operated upon, is extreme. Wait until reports prove the falsity of this prognosis and prove that surgical intervention is not as harmless as we are pleased to say.

In few words: To have chronic frontal sinusitis is less grave than we believe; to operate for frontal sinusitis is more grave than it is said to be.

I speak to draw attention to this point, and I now leave the matter to statistics.

Two Interesting Cases of Endocranial Complication From Suppurative Otitis Media.

Bonhin (Brest).—These two observations are interesting from two different points of view. In the first there was a sub-arachnoid meningeal hemorrhage following shortly after an electro-diagnosis of facial paralysis in a patient operated upon two months previously for chronic otorrhea and mastoiditis. Death ensuing within 48 hours it was naturally attributed by the patient's family to the employment of the electricity. The vascular changes are of course the only harmful ones in this case. But we may ask whether in the absence of the usual causes of fascular change, the otogenous infection of long duration may not be blamed

The interest of the second case lies in the rarity of the lesions observed, the exact diagnosis of which was difficult if not impossible. There was adhesive thrombosis of the right sinus, with an empty lateral sinus corresponding to the right ear which was attacked with otorrhea and condensing mastoiditis. Lastly, there was suppurative leptomeningitis of the opposite cerebral hemisphere.

Two Cases From the Laryngological Clinic.

Jacques (Nancy).—(1) A hook caught in the larynx; extraction by inter-crico-thyroidal laryngotomy—The patient was a girl of 5½ years; the body, a corset hook of 12-18 millimeters, lay between the cords, the hook disappearing in the subglottal space and the rings lying on the upper surfaces of the vocal bands. The narrowness of the approach and the position of the body necessitated an operation from without, i. e., a single incision in the crico-thyroid membrane. This simple method ed an incision in the thyroid. It furnishes, even in a child, an entrance into the subglottal space large enough to permit the extraction of a foreign body whose transverse dimension does not exceed the antero-posterior diameter of the larynx.

(2) Bilateral crico-thyroidal ankylosis following a high tracheotomy (intercrico-thyroidal laryngotomy).

The patient was a man of a man who had been operated on in America, in an emergency, for a stenosis due to gummi of the right vocal cord, and who had worn a canula for 14 years. The incision in the air passage was made in the circo-thyroidal space encroaching somewhat on the thyroid itself. The presence of the canula in the subglottis seemed to have caused a partial, bilateral symmetrical ankylosis of the cords in the cadaveric position. This observation confirms the opinion expressed by Moure of the dangers of the high incisions (laryngotomy and crico-tracheotomy) in the treatment of acute stenosis of the larynx. An actual stenosis can develop secondarily by fibrous ankylosis or chronic myositis.

Ruault did not think that the high tracheotomy was a bad operation. If it gave bad results it was because a canula too large or too long was used. He himself, always tried to make the inter-crico-thyroidal operation, and inserted a small canula which was sufficient for respiration, did not disturb the patient, and caused no trouble in swallowing.

The Treatment of Laryngeal Tuberculosis.

Mermod (Lausanne)—The active interventions classed by Heryng as surgical treatment are far from being in favor today, and if Heryng claimed 5 years ago that he knew colleagues who did not dare to publish fortunate cases for fear of being compromised, it is just as true now. The objections are many; the nature of the process, almost always secondary; fear of spreading the process either in the organism or the larynx itself by opening new paths of infection; relapses which are the rule; difficulty in treatment finally, possibly of curing by general treatment.

The author is not the only one to admit that primary laryngitis is much more frequent than has heretofore been supposed, but is far from limiting intervention to the minority of cases, having been able to convince himself a number of times, that the larynx can heal in spite of much involved lungs and that this cure has an enormously favorable influence on the lungs themselves.

The dangers of post-operative dissemination, of which the author reports two doubtful cases of his own, are rare and more theoretic than real. Even though recurrence takes place, which is not the rule, the patient is markedly benefited, often for years; it is not more grave than the primary attack and not more difficult to treat, if the patient is not lost to sight too long. As to the pretended difficult technic it cannot exist except for the debutant. Finally, the cases of spontaneous cure are too rare to be used as arguments for nonintervention.

The rational treatment should be as surgical as possible, even in the primary period, when the disease is circumscribed and the general condition best. And later, except in absolutely hopeless cases, it is better to operate upon a larynx that is seriously involved, cure ensuing sometimes and improvement always. There is not only relief of short duration, as in certain medicinal treatment, but real improvement, depriving laryngeal tuberculosis of its cruel character.

The speaker sought to show that the method of timid treatment lost valuable time. The treatment with lactic acid does not merit its renown; it is slow and painful, and inefficatious as soon as the tissue is infiltrated. Interstitial injections are still more painful and constantly invite edema—the speaker reported 3 cases where tracheotomy became necessary.

Curettage, a brutal method, has the inconvenience of lifting masses of tissue without completely detaching them. Ablation with the cutting forceps is more surgical; it would be the best of all procedings and with a proper technic would permit complete cleaning out of the larynx per vias naturales if the danger of hemorrhage were not present. This is why the galvano-cautery method remains ideal, obviating hemorrhage and infection better than cutting operations. Edema occurs only in the books. The method will not succeed unless it is used energetically with the destruction of large masses of tissue. The good old thermic is still the best we have to hasten sclerosis; nothing has been able to dethrone it and it deserves first rank in the treatment of laryngeal tuberculosis. The speaker, in support of his conclusions, reported fifty cases all favorable to surgical treatment. In many of these cases there was definite cure, even when the state of the larynx appeared desperate, and the number of successes augmented with the exclusive employment of the galvano-cautery.

External Peritonsillar Phlegmon. Infection Due to Foreign Body.

AIMAR RAOULT (Nancy).—E. D., aged 24 years, came to me for consultation July 21, 1903. His condition as noted by my confrere, Dr. Pillement, was as follows:

The patient had had violent pain for eight days in the ear and was unable to open the mouth. Deglutition was impossible both for solids and liquids. During this time the patient had insomnia, absolute anorexia, and fever. His color was leaden, the skin was covered with profuse perspiration, in short, he presented all the indications of septicemia.

The head was inclined towards the left side, and a considerable puffiness of the left retro-and submaxillary region could be seen. This puffiness gave on palpation, a sense of woody hardness, and it was only with difficulty possible to make out the underlying ganglia, which were embedded in a mass of connective tissue infiltrated with cells.

The patient was hardly able to open his mouth half way and the teeth and tongue were covered with athick saburral coat, and the breath was very fetid. It was very difficult to depress the tongue and examine the throat. The soft palate on the left side was edematous in front and behind the tonsils. This was adherent to the anterior pillar, which almost completely covered.

Finally, the entire left tonsillar region was swollen, extending internally and anteriorly.

Pillement punctured the soft palate just behind the tonsil, by means of the electro-cautery, which procedure yielded a small quantity of pus. He at the same time prescribed powdering with warm menthol-phenique, and hot compresses to the neck.

On the morning of July 22, the patient knowing that I should have returned, came to my office. The pain had become worse and worse, the general health was very bad, so I suggested that he enter my hospital. He refused and went home, a village near Nancy. The same evening, as I could not leave, Pillement went to see him and made a new incision with a bistory, behind the tonsil. This incision again gave a little pus. After this operation, the patient felt relieved; nevertheless, in the night, the pains reappeared, and the patient decided to go to the hospital the next day.

July 23, I saw him at Ste. Marie's hospital. The pain which had diminished some after each operation, had increased. The general state was worse and worse. On introducing my finger into the mouth, and pressing on the left tonsil, while the other hand was placed on the lateral region of the neck immobilizing the skin, I could feel a deep fluctuation. There was at the same time a subtonsillar and peritonsillar abscess.

To open the external peritonsillar abscess through the mouth was difficult because the patient could not open his mouth, and even more because of the adhesion of the tonsil to the anterior pillar of the palate, which entirely covered it. In order to make this opening, I used a pair of curved scissors held in the left hand, guiding it by my right finger introduced into the mouth. With the scissors, I attacked the internal face of the tonsil, making an incision about one centimeter deep, then closed them and utilized them as a probe to open up the deeper parts, and to get at the abscess. When this occurred, a mass of extremely fetid pus appeared.

During the following days, the cure gradually progressed. The adenopathy diminished and the general condition mended very rapidly. At the end of a week the pharynx and tonsils had taken on an almost normal appearance.

The day after the opening of the abscess, the patient said he felt on expectorating some pus, a sharp body which pricked him in the mouth. He showed us the foreign body. It was a kind of little straw, 1½ centimeters in length, very slender and undulated.

He then remembered the following facts, with which he had not made us acquainted in the beginning: About the end of June, while out walking, he chewed an ear of wild barley. He swallowed a piece of it which stuck in the lower part of the left tonsil. He said that at that moment, he had felt a sharp sensation of pain. With his fingers, he pulled out a piece of the spicule, and thought he had removed all. Some days later, when he had forgotten about this, he felt a slight pain in the tonsillar region, which increased during the succeeding days. Little by little, he experienced difficulty in opening his mouth. In about a week the pain became very great on deglutition. Finally, about the 15th day, the adenopathy appeared.

This case seems worthy of relation on account of the two following peculiarities:

1. Coincidence of the subtonsillar with a peritonsillar abscess.
2. Infection of the tonsil by a foreign body, and the very gradual evolution of the phlegmon before the apparition of grave symptoms.

Results of the Application of Penghawar in Hemorrhages of the Skin and Mucosa.

Mounier.—Penghawer, already introduced into France, has been employed by the author for more than a year in all his intranasal operations. He advises careful cleansing of the wound before applying the fibrils of djambi, which may slip between the mucous layers and produce irritation of the tissues. The penghawar is put in without stuffing the nose, and is removed by forceps after 24 hours.

Its advantages are as follows:

1. Perfect hemostasis, even after the use of adrenalin.
2. Permeability of nasal fossae, which is not obtained with ordinary dressings.
3. No hemorrhage upon removing the fibrils, such as occurs with other dressings.
4. More rapid cicatrization of the wound.

External Oculo-motor Paralysis, Otitic Origin.

Lannois and Ferran, (Lyon).—H., 38 years old, after ten days of violent pain in the left ear, had a discharge which at first gave relief. Then the pain reappeared in the ear, together with diplopia. The latter was due to external oculomotor paralysis of the same side. Insufficiency of drainage; incision of a large swelling above and behind. Cure of the otitis and abductor paralysis in three weeks. At no time were there symptoms suggesting involvement of the apophysis, the meninges, etc.

The writers, after discussing various theories (subdural abscess, edema of the pia mater, meningitis, cerebellar abscess, etc.), conclude that in slight cases such as theirs, paralysis of a reflex nature may be produced probably through the vestibular nerve and Deiter's nucleus whose relation to the nuclei of the oculo-motor nerves is known.

This case shows that it is not always necessary to attach grave prognostic significance to ocular palsies arising in the course of otitis.

LUBET-BARBON. I have seen two cases of external oculomotor paralysis, upon the diseased side, in cases of otitis. Both patients were trephined. In the first, a girl of seven, the trepanation was carried into the skull, through fear of an extradural abscess going to the lateral sinus. It is a curious fact that under the chloroform the paralysis seemed to disappear and both eyes were turned upward and toward the diseased side so well, that I wondered if the paralysis was not due to contracture of the common oculo-motor.

Both patients were cured which proves that these troubles are not as grave as they might be if due to an intracranial lesion.

M. CHEVAL (of Brussels.)—I thank M. Lannois for his interesting communication. It permits me to say a few words concerning a curious case of paralysis of the external oculomotorius, the sole sign of an apparently cured otitis. Upon entrance at the Hospital of St. Peter, Brussels, the patient told us that he had been treated six weeks previously for an acute influenzal otitis, the right ear having suppurated, and complained of intolerable occipital pain. The tympanum was cicatrized; the temperature during his sojourn varied from 37 to 38.5 C.; the patient presented a paralysis of the right external oculo-motor nerve. Analysis of the cephalo-rachidian fluid gave no information.

I proposed an antrotomy, prior to cranial trepannation for examination of the cavernous sinus. The patient refused. An amelioration of the symptoms set in; the temperature was about normal, the occipital pains disappeared. At the third examination the patient complained of embarrassed deglutition and a painful sensation in the cavum. We found a swelling in the fossa of Rosenmueller, which projected beyond the posterior pillar. Its incision gave issue to a little pus. The temperature which had reached 39.5 came down to normal the external oculo-motor paralysis ceased.

I do not believe the patient is cured; I persist in thinking that I ought to operate. The abscess shows the possibility of a lesion of the tip of the petrous, but I shall wait for new indications. The patient remains thin, under observation.

Note upon the Employment of Adrenalin in Malignant Affections of the Throat.

Raoult, (Nancy).—The author had several times employed adrenalin (1 per cent.) on tampons to malignant tumors of the pharynx and larynx. In this case the adrenalin had been applied in small quantities for several months. Finally sloughing of the diseased tonsil took place, accompanied by violent reactionary phenomena.

Action of the N-Rays Upon Audition.

Raoult, (Nancy).—The N-rays discovered by Blondlot have been studied by Charpentier as to their physiologic action. The experiments described by Raoult were made in collaboration with Prof. Charpentier. Bodies emitting the N-rays clearly produce an augmentation of auditory phenomena, whether brought near the ear or applied to the cranium in the vicinity of the auditory centre, or the subject touch with the finger tip the source of the N-rays. Moreover, it appears that the increase of hearing is accompanied by an elevation of tonality, for example if diapason be used. Finally, the N^2-rays diminish audition.

A Case of Neoplasm of the Larynx Treated with Success by the Roentgen Rays.

Beclere and Paul Viollet.—The patient had cancer of the larynx and was subjected to radiotherapy by Dr. Beclere. The diagnosis of cancer was made by Drs. Viollet, Chauffard, Launay and A. Beclere.

However, the microscopic examination being wanting, the value of this case as a demonstrating of the efficacy of radiotherapy for cancer might be debatable. It is none the less interesting as showing that the X-rays can exercise a favorable action upon lesions of the laryngeal mucosa through the cartilaginous framework of the larynx and the soft parts covering it.

If the diagnosis of cancer was justified it remains for time to confirm the results obtained, the cure being too recent to permit final judgment.

The patient, M. B., shown to the society, on Nov. 25, 1903, had a tumor of the left lateral wall of the larynx. It did not seem ulcerated, but as it projected considerably into the laryngeal cavity, it concealed a large part of the vocal cords, and extending beyond the aryteno-epiglottic fold of the diseased side, it reached the neighboring wall of the pharynx. The patient, furthermore, showed an adenitis on the left side of the larynx, of the size of a small nut.

The dysphagia was very pronounced. The patient had lost 18 pounds in two months, being unable to feed himself, without extreme pain, with anything except a little milk. His voice was considerably changed.

As the patient had refused a total laryngectomy proposed by Launay and Viollet, Dr. Chauffard conceived the idea of sending him to Dr. Beclere to try the effects of radio-therapy.

Dr. Viollet, who followed the evolution of the lesion, found on Dec. 25, an ulceration of the tumor, which seemed on the point of necrosis. Two months later, the tumor had decreased in size, and the ulceration was limited to the region first occupied by it. The adenitis had almost completely disappeared. There remained at the place of the tumor, only a sort of cicatrical excavation in the center of which the left arytenoid could be seen. Only the immobility of the left side of the larynx had persisted. The cervical adenitis had disappeared. The patient had gained 16 pounds, he ate without difficulty, his voice was completely restored. The patient had been treated by Beclere with the X-rays from Dec. 1 to Dec. 12, 1903, on Dec. 23, 24, 25 and 26, 1903, on Jan. 11 to Jan. 31, 1904, and from March 7 to 29, 1904. Instruments—induction coil of 35 cent. spark, primary currents 6 amperes, 70 volts, a Villard osmoregulator, a spark of 7 centimeters.

The distance from the tube to the skin was 15 cent. During the first period of the treatment the left and right sides of the neck were alternately exposed, but during the remainder only the affected side. The length of the treatment was 15 minutes, during the first 3 periods of treatment, and 10 minutes during the last. Discontinuance of the cure was necessitated by a radio-dermatitis having cause a redness and even vesication in one case.

So far only one comparable case has been published, viz., that of a lawyer with a laryngeal tumor diagnosed as cancer and treated with the same success by W. Schreppergell (*Revue. hebd. de laryngologie,* 1903, No. 11, page 305).

Delsaux.—I have had no personal experience with the Roentgen ray in cancer, but I have had occasion to submit a case of epithelioma of the larynx, whose diagnosis had been confirmed by the microscope to the action of radium. The results, though incomplete were satisfactory. As a result of the treatment the superficial tissue of the tumor became condensed.

I hope to obtain better results with a purer radium than I used.

In addition, I cured a case of squamous epithelioma of the nose in six treatments.

The Post-Operative Treatment of Petro-mastoidectomy by Insufflation of Boric Acid and the Immediate Resection of the Posterior and Superior Walls of the Membranous Meatus.

Caboche, (Paris).—Delsau confirmed the excellent results obtained by him in 20-25 cases. But he asked why the author did not more often employ suture of the flap.

Lermoyez asked what was the proceding of the author in cases of large mastoid openings with large denudation of the sinus and destruction of the mastoid tip and even a part of the temporal squamous.

Lombard was not partial to immediate suture. It was sufficient to allow the retroauricular wound to close little by little. As to the large wounds mentioned by Lermoyez, the speaker had been able to treat them by boric acid dressings only.

Caboche. We did not suture immediately, especially for the purpose of watching the progress of epidermization in the proceding employed.

We believe that there are no inconveniences in making immediate suture except in case of infected cholesteatoma, or in case of very free opening of the mastoid cavity.

As to the large wounds mentioned by Lermoyez there is no contraindication to filling the auricular cavity with powdered boric acid, and dressing the remainder of the wound according to the principles of general surgery.

Dr. Hennebert. In one case, had had perfect success with boric insufflation, and resection of the posterior wall of the membranous canal.

Voluminous Polypi of the Choanae. Extraction by the Buccal Route. General Remarks.

Bar, (Nice).—In this communication the author applied himself to a minute description of the symptoms of nasal polypi and set forth the various procedures for the cure of this affection. Extraction by the buccal route alone succeeded in this case. It is sometimes the sole possible means to employ either by reason of the enormous size of the growths which cannot be extracted by the nasal way, or because it is the only way of grasping them. The observation also showed the possibility of mixed polypi, such as Paris previously confirmed in an anatomopathologic study of this species.

Hemmorrhagic Inflammation of the External Auditory Canal and Middle Ear.

Bar, (Nice).—The author, in support of what he had previously said in a former work upon hemorrhagic otitis externa, reported a case in which inflammatory phlyctenules distended with dark blood having been observed in the external ear, the inflammation did not limit itself to the meatus but rapidly invaded the tympanum, in such a way that a bloody discharge came through the tube into the pharynx, and through the meatus both from the canal and the tympanum after perforation of the membrana. The literature shows few cases. They should generally be regarded as grave and of infectious origin, influenza among other causes. Colonies of microbes are found among which the staphylococcus pyogenes aureus has been remarked.

The Most Practical Procedure for Removal of Incarcerated Tonsils.

LOUIS FACHER, (Orleans).—A firm partisan of total ablation of diseased tonsils, whatever be their size, I have continually sought for a method which would be the simplest, the most rapid and the least dangerous.

The employment of my forceps for curetting the tonsillar recess, which has become common, has made marked progress in this matter. But by modifying the cautery snare or cold snare methods it is possible to remove the tonsil entirely at a single stroke.

My method is as follows:

1. Liberate the tonsil as much as possible from the pillars in front, behind and below with the stylet of Higgnet, the plicotome of Lermoyez or my stylet scissors.
2. Pass through the loop my mouse tooth forceps, or Museux's, seize the tonsil far back, draw it inward and carry the loop toward the pillars while the tonsil is drawn from its seat.
3. Contract the loop and turn on the current. If the cold snare is used contract it slowly in order to crush the vessels before cutting them. The cutting should be slow in proportion to the age. Thus the danger of hemorrhage is diminished, which for that matter is very rare and less to be feared than with any sort of morcellation. Traction upon the tonsil, drawing it from its seat, does not lead to cutting large vessels, since it has been shown that between the tonsillar bed and the internal carotid there is the pharyngeal wall and the pharyngomaxillary space. I have removed the tonsils by this method many times. I have found only advantages and no inconveniences in this method.

Consultation in a Case of Laryngectomy.

MOLINIE, (of Marseilles).—He related an observation of total laryngectomy done upon a man of 63 for carcinoma of the larynx. The patient was well, surgically, on the 8th day, being able to swallow normally, but succumbed 6 days later of broncho-pneumonia which came on 5 days after operation. Molinie brought out the contrast between the operative cure and the fatal outcome of the broncho-pneumonia. He believed that the latter might follow by operative and post-operative infection. He recommended as preventive measure to operate aseptically by avoiding any flow of blood into the trachea, and to follow operative by post-operative asepsis, that is to say by local and personal asepsis. M. presented the material removed at operation.

Syndrome of Meniere Recurring in the Course of Chronic Catarrhal Otitis. Cure of the Vertigo by Retro-nasal Curettage.

Bertremes, (Charleville).—Patient aged 59 ears. Vertigo, tinnitus, vomiting for 18 years. Slow progressive left deafness. Retraction of left tympanum, hypertropic retronasal pharyngitis, intact labyrinth. Air inflation improves audition, and continued for some weeks, diminished the number of vertiginous attacks. Post-nasal curettage and discission with Ruault's hook. No vertigo since; cure maintained up to the present.

Gummata of the Intermaxillary Region.

Veillard, (Paris).—Two cases of gumma of the nose. The lesions were localized by the anterior part. The first patient presented the cardinal symptoms of nasal obstruction and pain upon pressure, permitting an early diagnosis. Specific treatment led to a rapid disappearance, but there were several returns, and at the end of two years, if the patient ceased treatment long, the nose became stopped up, the palate became sensitive and the four upper incisors were loosened.

In the second patient the lesions were still more serious. There was successive elimination of two cuneiform sequestra, each containing two incisors, corresponding exactly to the two intermaxillary bones. Cicatrization, Prosthetic apparatus.

Ethmoido-Sphenoidal Empyema in a Child of 12. Clearing the Ethmoid Labyrinth and Curettage of the Sphenoidal Sinus by the Orbital Route.

Escat, (of Toulouse).—A boy of 12, after a probable streptococcic angina, was attacked with acute otitis and ethmoido-sphenoidal empyema complicated with orbital involvement and optic neuritis, followed by atrophy. Two months after the beginning of the illness I was called to operate. After unsuccessful endo-nasal treatment I went in throuph the orbit, opening the ethmoid labyrinth in the course of which the middle and superior turbinates were removed, and I utilized with great facility this route for curettage of the sphenoidal sinus. Considering the nasal drainaye sufficient, I sutured the orbital wound. Favoraple results; complete cessation of nasal discharge and cicatrization after 7 weeks.

From this operative result I conclude:

1. That in case of ethmoido-sphenoidal empyema, the orbital route alone suffices to reach the ethmoidal labyrinth and sphenoidal sinus.

2. That the substition for the ethmoid labyrinth of a large bony cavity, giving free communication between the orbit and nasal cavity fully assures nasal drainage without orbital drainage.

Laryngeal Tuberculosis. Inter-crico-thyroid Laryngotomy. Final Thyrotomy with Resection of the Right Vocal Cord; Survival for Eighteen Months.

Chavasse, (of Paris).—The patient came for treatment the first time in a state of asphyxia which necessitated urgent laryngotomy. He had perichondritis and diffuse infiltration of the larynx. The expectoration contained Koch's bacilli. Syphilis 19 years previously. Specific treatment after putting in a permanent canula, stopped the perichondritis, but the intralaryngeal infiltration persisted together with tuberculosis vegetations.

Thyrotomy with curettage of the laryngeal cavity and excision of the right vocal cord was then done. Three months afterward the patient was able to take up his duties; he still had, however, a thyroid fistula, opening intermittently. He died of terrific hemoptysis 18 months after operation, when he considered himself cured and was in full activity.

Treatment by Mastoid Opening of Condensing Osteitis (Neuralgic Form) of the Mastoid Apophysis, Which Complicates Chronic Otitis Media.

Augieros, (of Laval).—This work was based upon the observation of four cases. The characters of the affection are:

1. A violent and persistent neuralgia of the affected side, assuming the fronto-temporo-occipital or temporo-occipital type.

2. Absence of external signs of mastoiditis except spontaneous pain and pain provoked by pressure.

3. Lack of proportion between the intensity of the pain

neuralgic crisis demanding operation, the otorrhea had been cured and tympanum epidermized 6 months. In the second case there was only slight suppuration. In the third case there had been no discharge from the ear for two years. The last case had old chronic middle ear sclerosis, the ears never had suppurated, there were no cicatrices of the m. t.

4. Resistance of the neuralgia to all treatment and hyperesthesia of the ear which manifests itself in an exacerbation of the pain after the instillation of analgesic solutions, however weak and unirritating.

5. The great effect of the malady upon the general state of the patient (insomnia, anorexia, rapid and extreme loss of strength).

6. The rapidity of the cure of the neuralgic pain, which disappears quickly after mastoidotomy.

The bone alterations found at operation are those of condensing ostetis at different stages, without trace of suppuration.

The neuralgic pains are explained as due to compression of the nerve filaments in the condensed bone tissue.

Conclusion—Condensing osteitis of the mastoid is a formal indication by itself for mastoid opening, independent of the state of the ear. The operation should cover the greatest possible extent of external mastoid wall and should remove most of the condensed bone.

From the standpoint of the relation of otology to general medicine, condensing ostestis of the mastoid may be compared with an affection observed by Prof. Gosselin in the long bones which he has described under the term of neuralgic or osteoneuralgic osteitis in his clinical lectures and in the article upon bones in the new dictionary of medicine and practical surgery. Professor Gosselin has not observed this affection in the flat bones.

(To be continued in next issue.)

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XXXIV.

THE NECESSITY FOR THE OBLIGATORY TEACHING OF OTOLOGY IN THE MEDICAL SCHOOLS.*

BY PROF. A. POLITZER.

VIENNA.

If I broach this subject to-day before this distinguished assembly composed of the chief representatives of otologic science in every country, it is not with the pretense of demonstrating to you that official instruction in otology in the medical schools is necessary for practitioners. Such a demonstration appears to me to be really superfluous in a congress, the members of which belong to our particular science.

An exposition of this theme in an international congress of otology appears important to me because an affirmative vote of such a congress cannot be ignored by the authorities charged with the direction of teaching in the schools of medicine.

The demand for obligatory instruction of otology in the schools is not a new thing. In 1879 V. Troltsch addressed a memorial to the German chancellery in which he showed by convincing arguments that otology should occupy the same rank as other branches of medicine, and that it was absolutely necessary for each practitioner to be capable to some extent of treating ear troubles; consequently that students should be subjected, at the end of their studies, to a special examination in otology.

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*Read before the International Congress of Otology at Bordeaux, August, 1904.

This proposal has remained without result, and since 1879 no effort has been made to realize this idea.

Recalling the disastrous experiences met with in general practice, I am impelled to show the wrong done to society by the absence of otologic instruction from the program of official studies in the medical colleges, and the absolute necessity, from a social view point, of a knowledge of otology by every physician.

It is of course useless to dwell at length upon the important role filled by the auditory organ in life; it is useless to recall that partial or total loss of hearing may injure the career of a person and deprive him of all social joys.

If we ask ourselves if this infirmity is an unavoidable consequence of pathologic aural lesions, we are obliged, in a great number of cases, to answer in the negative.

In fact, practice has shown that, in a large number of cases, defects of hearing, caused by catarrhal processes in the middle ear, may be avoided by treatment instituted at the proper time—treatment at the command of every physician and not requiring the intervention of a specialist.

Even more grave causes consist in the neglect or improper care of the so frequent suppurations of the middle ear, either acute or chronic, which may terminate in ulceration, caries and necrosis of the temporal bone, and complications, the results of which may be fatal.

Since statistics prove that most cases of meningitis, cerebral abscess and sinus phlebitis are of otic origin, it remains for us to discover if the fatal complications are inevitable, or if they may be reduced to a minimum by therapeusis instituted at the outset.

One could doubtless answer this question affirmatively, thanks to antiseptic treatment of middle-ear suppuration; the grave complications of otitis being due to stagnation and septic decomposition of the middle-ear secretion, for to retard the disease is easy for any physician initiated in the most simple methods of examining and treating the ear.

One is shocked by the number of deaths in the country occasioned by otic affections in the course of violent influenza epidemics.

Here we see mastoid abscesses form, which, if they are not operated upon in time, end fatally by cerebral complications, while the patient would have been saved by opening the abscess, which could have been easily done by any physician.

In these circumstances is it admissible to consider otiatry as holding a rank inferior to other specialties, such as dermatology and ophthalmotology? No; on the contrary, we would assign it a privileged place, compared with certain obligatory branches which in most cases deal only with functional manifestations, while many ear diseases jeopardize the life of the patient.

Now, can we reproach the physician who has quitted college after brilliant study, if he is incapable of caring for common forms of ear affections? Certainly not, since otology does not appear on the official list of studies.

Here we touch the culminating point of our subject, and it is necessary for us first to consider the present state of otiatric instruction in the European and transatlantic universities, and ask ourselves if it suffices for its humanitarian object.

It is not necessary to go back more than fifty years to find that there was no thought of otology in the universities.

It was an almost ignored specialty in the middle of the nineteenth century when other branches of the medical art had already set a place apart for themselves. It was only after the anatomo-pathologic researches of Rokitansky and Cruveilhier that Toynbee made himself noted by his dissections of the auditory organs. These researches have had as a consequence a lively scientific activity in otology, thanks to a little phalanx of enthusiasts in this specialty, which in a relatively short time succeeded in divorcing otology from empiricism, organizing it into an autonomous science, and placing it in the same rank as other special branches of the medical art.

In a comparatively brief space of time modern otology has achieved such importance that several medical colleges in Austria, in Germany and in Italy have been obliged to admit otiatry to a number of disciplined clinics.

At the beginning they were always content to assign assistants in the Faculty to teach otology in the out clinics. For a commencement this method of teaching appeared sufficient.

It was only after more than ten years experiment that there were obtained from the authorities regular otologic clinics, by showing the inadequate care of non-hospitalized patients. But it was more especially the rapid development of aural surgery, necessitating rigorous operation asepsis and proper surroundings, which hastened the establishment of otologic clinics.

From a historical point of view, I would remark that it was at the University of Vienna where an otologic clinic was installed, the first time in the whole world, in 1873. The value of this example is well recognized, since from it came the impulse for the foundation of hospital clinics in other European countries.

In spite of the advance made by otologic science since that epoch, both in Europe and on the other side of the ocean, and notwithstanding this specialty has attracted a number of enthusiastic adepts who have both scientifically and practically elevated otiatry to a place equal to other specialties, we see with regret that after thirty years they have obtained only a precarious footing in the universities.

The limited time of this Congress will not permit me to enter into details concerning the present status of otology in the different countries of Europe. I will content myself with pointing out the numerous divergencies in the university otologic departemnts.

While in some countries this science has attained a position almost coequal with that of other medical branches, there are others in which the government does not support any otologic clinic and official otiatric instruction is wholly wanting.

Even where well organized otologic clinics exist, the students have derived little profit from them. I attribute this fact to the ignorance of pupils as to the practical benefits to be derived.

Once settled, the young doctor perceives too late the lacunae in his otologic knowledge and how difficult it is to fill up, the country practitioners rarely having opportunity to absent themselves long enough to complete their study.

In recent years, in Austria, Germany and Spain, every student is required to take a course in otologic practice without being obliged to undergo an examination. Although this is a progressive step it is only a half measure. Only a very small number of students profit by it, most of them, knowing they will not be examined, enroll for the course but never attend.

For leaving otology off the examination schedule the pretext has been advanced that the students are surfeited with work and that a new specialty should not be imposed upon them.

I believe, on the contrary, that without harm to the education of pupils it would be possible to further develop the practical side of the academic knowledge required, on condition that the purely theoretic branches be erased, in part at least, from the study card, considering that they uselessly burden the mind of the student and are never of either scientific or practical use in his career.

There should be no question of overdoing in imposing the study of otology upon students. The task of the professor would be to teach, on the one hand, fundamental principles to students who will devote themselves to general practice, and, on the other, to educate specialists.

The pupil who designs to do general work ought not to be loaded with minute details, which are indispensable to the specialist, but which he would never have occasion to put in practice.

But what we have a right to demand of the State, in the interest of public health, is to make it possible for every physician to diagnosticate the simple forms of aural affections which he meets in practice.

Just as he is expected to know how to treat a conjunctivitis rationally, he should be capable of caring for a middle-ear catarrh or suppuration.

I have consumed my time, and I believe I have demonstrated that the duty of the State consists not only in founding in each medical school a chair with a regular otologic clinic, but also in including otiatry in the required examinations, in order to put this specialty in the hands of every physician.

It would be of capital importance from a social aspect. The realization of the idea is of absolute necessity and should be attained sooner or later, when those who direct university medical instruction shall have acquired the conviction that otiatry should be considered equally important as other branches of medicine.

To emphasize this belief I have laid the matter before you, and I shall be happy if, in the presence of this illustrious body, I have succeeded in advancing the progress of modern medicine and the broad interest of humanity.

XXXV.

THE EMPLOYMENT OF MUCIN IN ATROPHIC CONDITIONS OF THE NOSE AND THROAT.*

By James E. Newcomb, M. D.

FELLOW OF THE AMERICAN LARYNGOLOGICAL ASSOCIATION AND OF THE NEW YORK ACADEMY OF MEDICINE; CONSULTING LARYNGOLOGIST TO THE ROOSEVELT HOSPITAL.

Attention is called in this paper to some of the properties and uses of a substance which we are not accustomed to include in the list of therapeutic agents. Such a consideration of it is an idea of the last few years only and is the result of a propaganda carried on by a London physician connected with the Central Nose and Throat Hospital of that city, Mr. William Stuart-Low. His researches in this direction have been so complete, his clinical experience so extensive and the tone of his conclusions so temperate that we ought, it seem to me, to take up the matter and see whether we have overlooked in this familiar substance an agent of therapeutic value. A study of the question must necessarily re-traverse most of the road followed out so carefully by the authority named.

The physiologist defines a proximate principle as one occurring in the body under its own form, not one into which the body may be ultimately resolved in the laboratory. The three great classes are carbo-hydrates, fats and proteids. These latter contain carbon, hydrogen, nitrogen, oxygen and sometimes sulphur. They are known to occur only in or as derived from living bodies. A subdivision of these is called colloids. These are albuminous derivations. In this class belongs mucin which may occur in the body either in its form or potentially in its forerunner, mucinogen. Mucin occurs under two conditions; first, as a cement substance between all kinds of cells, tissue mucin; second, on all mucous membranes, in mucous glands and in many epithelial and goblet cells. It exists therefore in the connective and more particularly in the embryonal tissues. It is said to form the chief constituent of the bodies of some invertebrates and is found in large amount in the bile. It is soluble in water and weak alkalies, is precipitated by alcohol, weak acids and acetic acid. It is not precipitated by heat. On boiling with dilute mineral acids it yields a substance which reduces Fehling's solution. It is probably in its origin the result of the differentiation of the protoplasm of certain animal cells. It is very difficult to give a compact formula of this class of compounds. One analysis of mucus from the human sub-maxillary gland gave the following results:

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*Paper read before the Section of Laryngology of the N. Y. Academy of Medicine, December 28th, 1904.

Carbon	52.31
Hydrogen	7.22
Nitrogen	11.84
Oxygen	28.63
	100.00

Primary analysis of mucin yields a proteid and a carbohydrate which is often referred to as "animal gum." There are probably several members of the mucin class. The function of mucin is to protect the delicate membranes on which mucus is poured out, not only against desiccation and from the injurious contact of foreign bodies but also under certain conditions from the effects of acid secretions held in confinement as in the stomach and bladder. While the former function is obvious everywhere in the body, it is on the mucosa of the upper air and food tracts that it is from the possibility of direct inspection most evident. Low's researches show that mucin has a retarding effect on bacterial growth, that sterile solutions containing it remain sterile for a long time on exposure to the air and that bacteria cease to grow in culture media when mixed with mucin.

May I briefly digress to state that this latter fact throws incidentally some light upon the earlier statements made by some authors concerning the bactericidal power of nasal mucus. A new chapter was opened in this discussion when Wurtz and Leromyez declared some ten years ago that mucus possessed this power very definitely in the case of the bacillus of anthrax and definitely in case of nearly all other pathogenic micro-organisms. From their experiments they concluded first that air passing through the nose reached the lungs in an almost sterile state and second, that the interior of the nose was not a veritable nest of microbes as had always been supposed but that the nasal channels were cavities relatively aseptic in which most of the inhaled germs perished. The stage of increased secretion in an acute coryza they regarded as an illustration of an aroused mucous membrane, striving to increase quantitatively its means of defense against bacterial invasion, viz, the secretion of an increased amount of bactericidal mucus. If this first attack on the enemy was successful, the disease stopped. If it did not and the invasion went on, the pituitary membrane called to its aid a second line of defense, viz, an increase of the diapedesis normally occurring on its surface, an increased leucocytosis. Mucus was succeeded by muco-pus and the phagocytic action of certain of the cells was brought into play. But as Thomson reminded us in 1900, no one was able to confirm the results of the authors named except one of their pupils Piaget, against the accuracy of whose work numerous well-sustained charges were brought. Thomson and Hewlett deny that nasal mucus is bactericidal, granting however that it either simply inhibits growth or at least does not favor it. It does not seem that whatever restrictive effect on bacterial growth nasal mucus may have is due to mucin alone. Piaget was never able to observe in test tubes the absorption of carmine grains or of bacteria by the leucocytes of nasal mucus but if he made the mixture while the mucus was still in the nose he was able to satisfy himself that the cells exerted their phagocytic action on the pneumo-coccus, the pneumo-bacillus and the Klebs-Loeffler bacillus. Thomson aptly remarks that "nature seldom limits herself to one line of defense and it would be hard to say whether the first 'fighting line' is given to the movement of the ciliated epithelium, the inhibitory action of the mucus or the phagocytosis of the leucocytes". Finally it may be recalled that the flora of the nose vary greatly with locality; in the vestibule, bacteria fairly swarm but in the deeper recesses of .the nasal chambers they are very scanty. Viollet found that in eighty per cent of his observations, the mucus from the interior of the nose was sterile.

What becomes of the nasal mucus under normal conditions? Low calls attention to the presence of but few muciparous glands in the olfactory portion of the nose but their great abundance in the respiratory. He also states that as defining the direction of the flow and the ultimate destiny of all mucous discharges in the normal nose, is the slanting position of the turbinated bones and the meatus. The tendency of the discharge is to pass downward and backward into the pharynx. The more watery discharges from the upper regions and accessory cavities tend to mildly flush the more viscid secretions down on into the pharynx.

When artificially applied to the nose and pharnyx, mucin solutions have a soothing and emollient action, moisten the surface and soften incrustations, readily facilitating their removal and preventing their re-formation. They obviate fetor which is one of the best points in their favor. By their hygroscopic action which is about one fourth as great as that of glycerine, they tend to restore the function of smell and favor the filtering and warming functions. If the amount normally present is lessened by disease there is desiccation and abeyance of function. A dry mucosa cannot functionate. Combined with an alkali the solutions neutralize the acid often found in atrophic rhinitis. They undoubtedly have an influence in retarding the epithelial metaplasia which is regarded by some as the underlying factor in this affection.

The source of mucin for therapeutic use is from the membranes of the calf and pig. As supplied in commerce, it comes in the form of tablets. As far as is known to the writer only one of the English firms has supplied the product. Acting on the suggestion of Mr. Low, it has put up the remedy in two forms. One is the "tabloid" containing five grains each of mucin and bi-carbonate of soda. This looks and tastes not unlike the familiar pepsin tablet except that it is a little darker in color. It is used primarily for internal administration and as a trochee for the pharynx. The soda is added because mucin wherever found in the body is always combined with an alkali.

The second preparation is the "soloid", composed of four and a half grains each of the mucin and the bi-carbonate and one grain of menthol. One of these may be dissolved in half an ounce each of sterile water and sterile lime water, the solution to be used in any of the familiar nasal irrigation apparatus. The solution thus made is somewhat mucilaginous containing coarse particles in suspension. If used in a spray tube, some warm water should be thrown through the latter once daily so as to prevent clogging. In my own experience I have not been able to verify all the statements made with reference to the keeping of mucin solutions uncontaminated for in the damp heat of New York summers the frequent corking and uncorking of the bottle during the clinical hour has led in the course of a few days to contamination. The menthol in the "soloid" undoubtedly acts as an antiseptic. This I found by experimenting with various substances before the preparation with menthol came into my hands. The best results as to preserving the solutions were obtained from adding thymol in the proportion of about half a grain to the ounce. This seened to meet every requirement and the solutions kept well during the hottest weather. It is better however to make fresh solutions every two or three days. Mr. Low advises the tying up of a soloid in a piece of thin muslin, soaking the whole in sterile warm water for an hour or more and then squeezing well so as to express all mucin into the solvent.

I have given this remedy a thorough trial during the last two years and feel convinced that it is a valuable addition to our resources. It is not a panacea. It is not a specific but its sponsor claims that it does more than anything else yet tried to relieve the discomfort of mild atrophic states in the mucosa of the upper air tract and to mitigate the distress and suffering of the more severe ones. As to its employment in softening crusts a generous application of the solution on a cotton swab is preferable to the spray. Right here I would like to re-iterate the caution expressed in Hajek's excellent book on sinus disease against the wholesale flushing of the nares when cases which seem to be ordinary atrophic rhinitis first come under observation, and when we are endeavoring to make an accurate diagnosis. If the crusts are carefully removed by cotton and if we find fluid pus under them, the presumption is that the crusts represent dried pus and by careful attention we may be able to detect the direction from which this comes and so be able to locate a focal lesion as the fundamental cause of the malady.

Mr. Low objects to the use of liquid grease in any form for softening and moistening purposes in the nose and utters a note of warning against the "oiling of the nose" which has become in recent years such a common procedure. Thereby we clog and paint over, he claims, the remaining half-atrophied mucus glands. If actual pus is present, it may be removed by a sodium sulphate spray which is one of the best solvents of albuminous material at our disposal.

No attempt is here made to discuss the pathology of what we call atrophic rhinitis. When a recent text-book written on distinctively conservative lines enumerates no less than eight different theories of causation each supported by men to whose ideas we are accustomed to give heed, it is very evident that the question is still unsolved. Probably no one theory will ever be found which will account for all cases. But however much we may differ in our estimates of etiologic factors we are doubtless all agreed that the immediate therapeutic problem is a two-fold one. First, we should keep the nose clean and second, we should stimulate the action of whatever glandular tissue remains. The great variation in the latter factor is what renders the prognosis as to ultimate cure so uncertain. My first experience with a stimulant was with thymol in glycerine and alcohol. Later I used ichthyol. I cannot assert from my own observation that mucin has done better than these but I feel convinced that it has been of just as great value and in some instances patients who have been on ichthyol and have seemed to "hang fire" in their progress have forged ahead again when placed on the mucin. This is, of course, a very common experience with all classes of remedies.

Mr. Low's English colleagues are somewhat divided, as far as can be judged by reading the discussions on his various papers, as to the utility of mucin. Some claim that other remedies give just as good results. He is by no means unmindful of the usual regulations to be given to this class of patients being in this matter thoroughly orthodox. He advises them among other things to avoid close and heated rooms and to avoid sitting too near the fire and observes that "it is singular how fond they are of doing just these things." Where possible, he counsels a good brisk walk in the cold morning air with deep inhalations. The domestic practice of indefinite salt-water douching, he strongly and rightly deprecates. Sometimes the solution of one soloid to an ounce of water is a little too strong and requires dilution. When the syringe is used, the head should be over-extended, being thrown as far back as possible, the left hand being used to keep it up by pressure. Thereby is swallowing prevented and the danger of throwing the liquid into the middle ear is avoided.

The general principles stated with reference to the use of mucin in the nose apply equally well to its use in the pharynx and larynx. With reference to the former and the nasopharynx, an additional word is called for. It is well recognized to-day that the pharynx is physiologically allied with the digestive rather than with the respiratory apparatus and that it has a close relation to the maladies of the former. Mr. Low notes that the secretion of mucus in the nose and naso-pharynx is far in excess of the amount required for lubrication and the function of maintaining moisture in these spaces in virtue of its hygroscopic properties. He declares that this over-abundant mucus is swallowed, is meant to be swallowed and that it protects and lubricates the esophagus and stomach. He also notes that many patients with dry noses and throats suffer from indigestion and constipation. Many of them have the red, dry tongue indicative of deficient protective coating in the stomach. To these patients he gives the tabloids, one before and after meals, finding that they help supply the deficiency of natural mucus coating, and act as a laxative, thereby proving superior to bismuth preparations which protect but are apt to retard bowel action. The supply of the remedy at my disposal has not been sufficient to enable me to do this except in one or two instances and I am not able to express any opinion on this phase of the matter. The point is well-taken however that in order to treat certain types of naso-pharyngitis intelligently we must not fail to take into account the condition of the stomach and bowels.

Finally in the series of papers to which such frequent reference has been made and from which quotations have been freely used, is one entitled "Mucin and Malignancy." The author notes that "the essential lesion in malignancy is the penetration of cells into surrounding tissues but whether this new departure on the part of the cells is the result of a cellular change or of some alteration in the intercellular resisting substance is not yet clear. The probability is that there is a certain degree of both. In old age the intercellular material undergoes a wasting change and as a result of this, its resisting power against the ingrowth of epithelial cells is lessened and thus the onset of carcinoma is favored, particularly as the overlying epithelium remains much longer active, and thus there is an influence inducing the cells to penetrate inwards among the tissues." A series of fifteen cases of malignant disease is analyzed and in each case a deficiency of mucus, a "hypomyxia" to use the author's term is noted. He instances several cases in which the internal and local use of mucin and nothing else partly relieved the annoying symptoms and one case or two cases in which a distinct retrogression of the malignant process took place. He suggests that in patients already operated on the mucin might be used to prevent the recurrence of the malignant process.

XXXVI.

ELECTROLYSIS OF THE EUSTACHIAN TUBE: A FURTHER REPORT.

By Thomas J. Harris, M. D.

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In 1901 the writer had the honor to present before another society a short paper which embodied a year's clinical study with the electro-bougie. This method of aural therapy was at that time comparatively new, although it had been introduced previously in Europe and before that by Newman in this country. It is however due to Duel, who in 1899 recommended its use, with certain important modifications in the technique, that it became known in America.

Duel's results with the method were so satisfactory and his claims so enthusiastic that we were all incited to attempts at imitation. Unfortunately our own conclusions as set forth in this paper were not so favorable.

Since that time the procedure has been tried by a goodly number of otologists, and several critical contributions have appeared, including one by Pierce and more recently a second paper by Duel which shows, it seems to us, a somewhat more conservative attitude but still a high amount of confidence in the value of the method in suitable cases. During the past three years we have continued our study of the method and as the result of such increased experience feel we are justified in a further brief consideration of certain questions in connection with the method which must suggest themselves to every thoughtful investigator. First, what, as a result of our personal experience, seems to be the real value of the method?

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*Read at the thirty-seventh annual meeting of the American Ological Society, held in Atlantic City, July 11th and 12th, 1904.

This naturally is the first question asked. In our original paper we drew from our analysis of some 75 cases carefully tested the conclusion that "the electro-bougie has a place in our aural therapy, though a less important one than at first supposed." Our later investigations lead us to regard this as a very fair statement of the situation. The indications for its employment are now well defined. We know that it is utterly valueless in cases of oto-sclerosis and indeed whenever the tuning fork shows involvment of the internal ear. Indeed the use of electrolysis is distinctly limited to those cases of hypertrophic otitis media with characteristic associated narrowing of the Eustachian tube. In a certain number of such cases we are able to give relief to the tinnitus or vertigo and less often to improve the hearing. Unfortunately the large number, in spite of careful selection (and this is of course essential to any hope for success) and patient application of the method, do not so improve. According to Duel's own figures, out of 58 men who reported using the method (28 extensively), over 40 per cent. gave it as their candid conclusion that it was of no real value.

Further, our primary investigation showed what has been borne out by the study of subsequent cases, *i.e.*, that the early beneficial results are too often only temporary and no lasting improvement is realized. That such should be the result a few moments of reflection will show to be but natural. Granting that the most careful treatment has been addressed to the nose and throat and every irregularity of the upper respiratory tract been reduced, no amount of ventilation of the middle ear can hope to effect the organic changes (which have already taken place) in chronic cases. The most that we can hope to accomplish is in a comparatively recent case of otitis media with swelling and narrowing of the Eustachian tube to restore it to a patent condition. This, because of the possible dangers which are liable to arise from the application, should in our judgment only be undertaken when the ordinary celluloid bougie under gentle but persistent use has failed to enter the tympanic cavity.

The Dangers.— Granted now that there is a field for the electro-bougie, though a limited one and that in a certain percentage of suitable cases the results are even permanently beneficial, what shall be said as to the corresponding disadvantages which may render the procedure an unwise and unsafe one?

In the article previously referred to, we stated that "its use is not without danger," and a proper knowledge of the anatomy of the parts and of the technique is essential. Further experience both by ourselves and by others has abundantly justified this conclusion. Duel, as a result of his letters of inquiry, learned of 33 accidents of various kinds. These were from the experience of 58 operators only, representing the pick of specialists in this country. How many accidents at the hands of the hundreds of the unskilled, incompetent, six weeks specialists scattered over the land, we will never know.

These accidents may be conveniently considered under the heads of.

a. Sepsis.

b. Traumatic.

c. Electrical.

a. A number of cases were those of acute otitis. These were probably due to imperfect antisepsis. It is a *sine qua non* to any attempt to employ the treatment that everything used, including catheters and bougies, be carefully sterilized. Even with the most careful preparations we question if it is always possible to secure complete asepis. In our reported case of acute suppurative otitis, followed by mastoiditis, we are confident every precaution was exercised. Certain it is that with the ordinary bougie no such accidents are wont to occur. It has suggested itself to us that there was a previous presence of bacteria in the tube, which only needed an open wound caused by the bougie cutting the mucous membrane to excite inflammation.

b. Traumatism.—Sepsis is not, however, the only condition to guard against. Nine cases are reported of breaking off of the bougie in the Eustachian tube. This is a most serious accident and has occurred in the hands of the most skilled operators, when least expected. A further form of traumatism is wounding of the mucous membrane. This is intimately associated with the third form of accident, namely, those the result of the electric current itself.

c. In order to properly appreciate such lesions we must consider the nature of the electric process. Electrolysis, if we understand it correctly, means the dissolving of the tissues into their component parts by means of the electric current, with the escape of free hydrogen. Such it has been claimed is the action of the gold bougie in the Eustachian tube. In our original communication, we stated that to our mind it is a question whether the process is a true electrolytic one. Further reflection during the past three years has only served to strengthen this doubt. There is little question that the three forms of electricity may be introduced by means of the bougie: 1st, galvanism; 2d, electrolysis; 3d, galvano-cauterization. It is our firm conviction that many of the temporary beneficial results are due to galvanism acting on the Eustachian tube and the middle ear. No amount of reasoning can convince us that when in two seconds a seemingly impassible barrier gives way, as it often does under the electro-bougie, a true absorption of tissue has taken place; rather has there resulted a stimulation or contraction of relaxed or hypertrophied membranes. We must not fail to recall that this occurs with a current of 1 to 3 milliamperes, which is not concentrated at the end of the bougie but scattered over its entire surface. In direct confirmation of this we know such apparent strictures are often found reformed at a subsequent visit. It is further true, as Dench has pointed out, that many seeming strictures are only rugae or folds of mucous membrane, which may be passed with ease by giving the bougie a different curve. And it is doubtless true that many times the brilliant passing of such strictures is merely a plunging through this mucous membrane. Where higher degrees of current are employed there is always grave risk of producing cauterization instead of galvanism or electrolysis, and we possess no rule when we can definitely say such limit is reached. Any burning is bound to be followed by subsequent adhesions. This, we regret to say, we inadvertantly gave rise to at the pharyngeal mouth of the tube in a patient suffering from a stenosis of the Eustachian isthmus, where no obstructions in the pharyngeal end had previously existed. In such a position the bands could easily be seen.

Similar cicatrices, not located so as to be seen by the examining mirror, are in our opinion, constantly wont to occur in the hands of those who use the electro-bougie, and this danger is continually to be borne in mind.

We would regret to be misunderstood in what we have said. We have endeavored to state our position in an entirely unbiased manner. As a result, however, of our previous investigations reinforced by further observation and study, we are forced to the following conclusions:

First. That there is a certain degree of value in the method, in a relatively small number of cases, notwithstanding that in the hand of many operators it has proved a disappointment, not merely in its immediate results, but much more in its permanent effects.

Second. The method has shown itself to be attended with no small degree of danger, and accordingly should be employed only after every other means of establishing the patency of the Eustachian tube has been tried and failed—not as a quicker easier way of doing this, without resort to other means.

The most scrupulous attention to antisepsis is essential, and the greatest gentleness as regards current and touch. Indeed we would go further and say it is a procedure which requires the manipulation and skill of an expert in its introduction. Not every one who provides himself with the apparatus, and can bougie the Eustachian tube, is competent to carry it out.

Finally.—In the majority of cases the process is not a true electrolytic one.

XXXVII.

THE PSYCHIC ELEMENT IN DEAFNESS.*

By Boulay and Le Marc Hadour.

Numerous works have been published in recent years upon the auricular manifestations of hysteria, in view of which they are now well known.

We know that hysteria may affect a perfectly normal ear or may become engrafted upon a pre-existing auricular lesion so that deafness is the first and only manifestation of the neurosis (mono-sensory hysteria), or on the contrary it may be associated with mutism or blindness, or that range of epiphenomena occurring in intense, confirmed neurosis.

But that the dynamic trouble occupies the entire clinical picture or that it is super-added to the ear affection is always possible to determine, for it shows its origin by a special sign. Gradenigo and afterward Chavanne have shown the evidences of hysterical deafness: diminution or disappearance of the sensibility of the skin of the canal and membrane, disappearance of perception for high and low sounds, absence of subjective troubles, diminution or disappearance of bone conduction, characteristics which are of unequal value.

Diminution of the cranio-tympanic conduction is constant in hysterical deafness, and when the deafness is total, this conduction is reduced to 0; in all these cases it is less than the air conduction.

Let us recall the very commodious theory of the neurone. In hysteria the central neurone has lost its relation to the principal neurone, so hysterical deafness always reminds us by its characteristics of a central deafness. This clinical fact one of us has already insisted upon in a previous work in the corollary: the absence of subjective phenomena; except when hysteria complicates an old anatomic deafness, the affection progresses without vertigo and tinnitus.

Besides these well defined aural manifestations of hysteria, we meet in many patients with functional troubles which are sometimes confounded with these under the rather too comprehensive designation of psychic deafness, but seem to us to be entirely independent of the great neurosis; not only does the deaf patient in question fail to show any of the usual stigmata of hysteria, but likewise the examination of the ears fails to show any of the signs indicated by us.

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*Read before the International Congress of Otology, Bordeaux, August, 1904.

In view of our study of a number of patients of this kind, we desire to express the value of this fact that in a large number of deaf patients, who may have had an initial provocative auricular lesion, there is a psychic element which contributes in a variable way more or less to augment the degree. A purely functional trouble is added to the organic trouble, causing increased deafness.

Deafness is complicated in a large number of cases by a certain degree of inattention. The patient ceases to listen, convinced that he cannot hear, and so isolates himself from the external world. This is, so to speak, a simple audition renouncement. When he is awakened, when his attention is attracted, he will hear perfectly what has previously escaped him.

Two things are necessary for audition, an auditory organ which receives and records the sound and a brain which interprets it. If the brain is not in action, the ear is a sort of useless phonograph without an auditor.

Among the nervous, this inattention ends by taking a very important place in the psychology of the patient; it creates an abnormal obsession of hearing power, a true auditory aboulia, which considerably increases the real trouble.

Sometimes it is restlessness which takes hold of the patient, he fears that he will lose his hearing; he is in a state of real anguish which excites the psychic functional trouble and increases the deafness. There is a true vicious circle; the deafness excites the anguish and this emotional state augments the deafness. Thus a real *phobia* is established little by little.

Auditory aboulia and auditory phobia are the two forms of these psychic troubles. For a long time it has been known that deafness causes a peculiar cerebral state—a special mentality. Believing in the futility of his efforts to hear, the deaf patient ceases to listen. What is at the onset simply a defect of attention becomes later a habit and deafness thus provoked is acquired and lasting. It is really a psychic deafness from self-observation.[1]

After a while a new phenomenon intervenes: the organ of audition, on account of its lack of exercise, loses its property of hearing as a member which has been inactive for a long time loses its customary function. It is upon this remark that Urbantschitsch has founded his method of re-education of the hearing by auditory exercises.

There are two phases in the evolution of these functional troubles superadded to the ear lesion:

1. A psychical trouble which has an ear affection for its point of departure is established in the patient and under the influence of this psychical trouble the ear loses more and more its habit of hearing and is diverted from listening.

2. Under the influence of this want of attention there is produced an inactivity, a paresis of the auditory nerve or of the center through default of exercise.

The two phases can only be artificially separated; they are reciprocal. In reality the psychic element always plays a role. As we said before, by a sort of vicious circle, the deaf patient hears less and less by reason of the inactivity of the auditory nerve, he believes that he is more and more incapable of hearing and by an interrupted psychical effort gives up more and more his power of hearing.

What holds good for the extremities in ataxia holds good for the ear. The real lesion is often less extensive than the functional troubles would lead one to suppose, and in awakening by education the attention to the useful movements, it is necessary to teach anew the utilization of these members.

It is somewhat analogous to the systematized psychical akinesis as abasic astasia which Sollier compares to a variety of amnesia.

Our patients forget to listen and sound does not awaken the attention of the auditory center.

We have found sometimes in these patients a restlessness, an anguish when they tried to hear, an emotional state which ought to group these cases with the phobias and obsessions. The patient fears he cannot hear and he does not hear. This state of inactivity of the auditory centers has been especially studied in deaf mutes. Delean, in 1843, then Krugelstein, who gave the picturesque name of auditory stupidity to this state, Urbantschitsch whose name remains attached to the method of auditory re-education, Gelle, Natier and the Abbe Rousselot, Astier and Aschkinasi, etc., are again and again in evidence. But it has not only been in cases of deafmutism or deafness that it has been observed. An analogous psychic trouble is often met in those slightly deaf, in those whom we are called to treat, namely, in the nervous, who being convinced that they can not hear, do not listen and become afflicted with phobia and loss of hearing.

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[1] F. Heckel. Surdité neurasthenique surajouteé à une lésion tubaire légére. Arch. int. de laryng., 1904, p. 135.

In the rare cases, which are particularly instructive because they demonstrate the question, the psychic trouble may occasion complete deafness, identical to that which we meet in affections of the internal ear. We meet, besides the extreme and the very light cases, all the intermediate forms.

The paradoxical results of testing hearing most often makes the diagnosis possible. We observe, for example, that the patient who hears voice poorly hears the tuning fork and watch well, and from this disproportion we get the idea that there is a psychical trouble, or a suspended nervous element. During the voice test, the patient being convinced that he cannot hear, does not listen. The tuning forks, on the contrary, surprise him, awaken him, and the sound is perceived. The same thing oocurs that is seen in an agoraphobic who in the midst of a discussion will pass without doubt a road which he would tremble to pass if his attention had been called to it.

The examination, in a word, will show those contradictions which mark these nervous troubles, those inconsequential characteristics of pathologic physiology which are met in hysteria.

At times there is an unexpected amelioration, out of all proportion to the means employed, which permits the diagnosis of auditive aboulia to be made, emphasizing the role of suggestion in the improvement. We have seen more than once, for example, the hearing of a patient whom we were testing, double after simply bathing the auditory canal with menthol, which gives a subjective feeling of freedom to the ear. Often the movement of the membrana tympani, under examination, with a Siegel speculum, re-awakens the auditive will, although only a modest examination was contemplated.

In certain cases, finally, the auditive phobia will reveal itself to the trained examiner by the restless manner affecting the patient during the examination. An observation of the patient as one speaks to him is sufficient to show that there is a psychical trouble added to his true deafness.

These psychic affections are found as often in men as in women, more often in the educated and intellectual than in the simple; in those subject to disease of the will, both as a sequel to cerebral overwork and of their nervo-arthric heredity.

The psychical element is installed most frequently in an insidious manner upon the ear affection; it may, in certain cases, manifest itself suddenly under the influence of an emotion or a traumatism. As a result of a traumatism there may remain a phobia, an obsession, as it is often the point of departure of hysteria. We have at present a patient who does not present any stigma of hysteria and who became deaf in consequence of an injury. He had at the onset stasobasophobia[1], that is to say, an abasic astasia with fear; he was cured by suggestion and re-education of his motor phobia, but he has a marked psychical deafness of the same nature.

Hearing for speech is nil, the patient hears a sound which does not signify anything to his mind—he does not interpret it, and this deafness is accompanied by normal bone conduction. Improvement is taking place by reason of suggestion and training.

CASE 1. *Complete nervous deafness of the right ear, partial deafness of the left ear for ten years.* Maurice X, aet. 19, was brought to us for a nasal obstruction due to hypertrophic rhinitis. During treatment we observed that his hearing was very poor and we learn that he has been completely deaf in the right ear and that his hearing has been bad in the left since he was seven years of age.

He has been examined at various times and has followed various plans of treatment, but without result, and further treatment had been discountenanced on the ground that a central deafness was present.

Affections of the internal ear are uncommon and we examined the patient without any intention of revising the diagnosis, but as a simple scientific curiosity.

Objective examination showed both drums slightly retracted; the external process projected, the handle of the hammer is thus placed backwards, there was a posterior fold and the light reflex was absent. This is the classical picture of chronic catarrh of the middle ear and we found its origin in the red secreting pharynx and in the nose, which on rhinoscopy disclosed two large hypertrophies, which caused him to consult us.

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[1] Sainton-Stasobasophobie, Gaz. des hôpitaux, Jan., 1903.

Examination of hearing showed the following:

Watch, left ear, 15 centimeters; right, 0.

Whisper, left ear, 5 meters; right, 0.

Loud voice, left ear, very good; right, 0.

On the left side there was a diminution of hearing in proper relation to the findings of the objective examination and just what is to be found in a slight chronic catarrh of the middle ear, but on the right there existed a complete deafness such as is found in labyrinthine disease.

The tuning fork tests show the following:

The Weber was indifferent!

On the left side the Rinne was negative, with very slight augmentation of the duration in favor of bone conduction. Schwabach very slightly increased. On the right side, much to our surprise, the tuning fork was heard by air conduction in the normal fashion, while the loudest voice could not be heard. Rinne was negative, as on the left side, and Schwabach slightly prolonged.

We found in this all the signs of a slight affection of the middle ear, but nothing indicating labyrinthine deafness.

The low pitched tuning fork is well heard on both sides. The high pitched fork is not heard in front of the meatus or upon the mastoid of the right side. The patient stated to us without having his attention called to the tonality of the instrument, that we were wasting our time in trying to make him hear a high pitched sound, as he could never hear the flute in an orchestra. To our astonishment neither the high pitched fork or the Galton whistle could be heard on the left side, which was but slightly deaf. We had a real paradox. There were the internal ear normal, while the Schwabach was prolonged, and there was a lapse in the scale of tones in which the high pitched notes were absent. There was no diminution of the duration of perception of high pitched tones, but an absolute suppression of the auditive function for the high pitched.

In view of these paradoxical observations, we began to think of a nervous affection rather than an anatomic lesion of the internal ear. We interrogated the patient from the subjective point of view, but he declared that he had never had vertigo or tinnitus. We hardly think of affections of the middle ear developing without Meniere syndrome. More and more we became convinced that it was a nervous affection engrafted upon an ordinary otitis media. The patient was of the emotional nervous type and had since childhood a marked defect of pronunciation, with stuttering. Was he a hysteric? We searched without result for the stigmata of this neurosis. We found no sensory disturbances of the skin or mucous membranes. The auditory canals and tympanic member were of normal sensibility. We felt authorized to make a diagnosis of nervous deafness, but without exact signs.

It was not hysteria of the ear, for we could find none of the clinical characteristics, diminution or disappearance of bone conduction. We decided to try the effect of suggestion and we prepared the patient for electrical treatment. We told him that the auditory nerve is re-awakened by this therapeutic agent and we commenced the re-education of his right ear. During these painful seances the attitude of the patient was characteristic. Hardly had we pronounced a word or a figure when the patient began to move on his chair, rubbing his hands twisting his legs, tossing his head and giving such marks of restlessness. With a nervous laugh, he cried "No it is not that, it cannot be, repeat," while he suggested any word or figure whatsoever. After a long time, he ended by repeating the word pronounced. This result was only obtained after repeated encouragements. He had appearance of anguish—the word came from his mouth with grief, timidly and as if with regret. In the happiness of having heard well the patient became calm and declared that he had heard well the first time, but that he dared not repeat it because he thought he could not. This agitation, this fear which seized the patient when he wished to repeat a word showed the state of phobia found in such an affected subject and in one affected by agoraphobia when brought into open place for example. We had our patient, who was considerably improved, examined by our confrere and friend, Dr. Sainton, chief of the clinic of the faculty. Our confrere after a minute's examination confirmed our views—that he did suffer from hysteria, but from a phobia, that he was afraid to repeat what he hears and that he was persuaded that he could not hear. Our patient had no disease of the ear, only an affection of the will.

Little by little we succeeded in awakening him and in forcing his will; we obliged him to hear and he made tremendous progress. The high-pitched sounds which the patient refused to hear, were at length perceived and, an interesting fact, their perception was at .first very disagreeable. After some weeks of training the result was excellent, hearing of watch being 30 centimeters on both sides; whisper 6 meters both sides; loud voice, heard well.

It is seen that hearing, for the watch, was doubled on the left side, going from 15 to 30 centimeters, figures which indicate the part played by the physical troubled superadded to the slight catarrh of the middle ear. Weber remained indifferent. Rinne feebly negative. Schwabach slightly prolonged.

Here, then is a slight chronic catarrhal otitis media upon which is engrafted a phobia, a psychical trouble, which on one side doubled the real deafness and on the other caused absolute deafness for voice.

The young man was forced to quit college and his family was much concerned as to what career he should embrace. Now he works in a commercial house, keeps in touch with his clientele, hears well, telephones, in a word he has taken up a normal life.

The coincidence of stuttering with deafness is, we think, quite interesting. The stutterer belongs often to a large family of nervous defective, which recruit the suffering from phobia and aboulia.

While we have an extreme example of psychical deafness, it is a pathologic rarity. The cases which follow, in which anatomic deafness is aggravated by a superadded functional deafness, represent a common type.

Case II. Miss D, aged 19 years, has heard poorly for some years, how long her mother is unable to say with precision. She has little tinnitus which is of feeble intensity. Watch test, right 0, left 4cm; whisper 0.5 cm. on both sides; bone perception slightly diminished. The diagnosis is sclerosis in process of evolution.

The mother remarked that her daughter was very inattentive. When a conversation interested her, she was able and seemed to hear sufficiently; if on the contrary she was not interested, she was absorbed in herself, isolated herself from the conversation and affirmed that she did not hear when in reality, she did not listen.

With the consent of her mother, we undertook to persuade her and to demonstrate to her that she heard better than she thought and to convince her that it was necessary to exercise her hearing. In order to stimulate her will, we added catherization and massage of the canal. .In one month we obtained the following results; Watch, right side, 4 cm.; left 10 cm.; whisper one meter on both sides. Here was an amelioration small but relatively considerable; hearing for whisper was doubled. The patient found that she was improved and followed conversation better. The good result might be ascribed by some to the local treatment; this would be wrong, for we only simulated in using the catheter without using inflation and only did this for the purpose of suggestion.

The improvement only shows the psychical element and measures it exactly. The aural affection has resisted all our therapeutic efforts. We cannot deny that the improvement was due to the suggestive treatment.

Case III. Mrs. A., aet. 68, had suffered from an attack of grippal otitis media suppurativa acuta on the right side. For two weeks the patient was entirely deaf and then she improved. At the end of two months, hearing had returned on the left side, but the right was still deficient, the watch not being audible on that side. The tympanic membrane had a normal appearance except that the rosy tint persisted; the perforation was closed.

Upon inflation with a catheter, the watch was heard at two centimeters. This improvement was of very short duration, sometimes disappearing before she left the office and the patient lost hope. At different times, the same thing happened, the improvement was immediate but ephemeral.

The state of inquietude of the patient, the strange manner of improvement, so rapid and so fleeting, made us think of a psychical trouble. In order to prove this we washed out the nasal cavities without catheterization and we told the patient that she ought to hear the watch. In fact, she heard it as after catheterization. We continued this purely suggestive treatment and improvement in audition took place day by day and hearing for watch increased to 30 cm. This improvement continued without the former recurrences.

The catheterization practiced in the beginning had only acted as a suggestion just as the nasal douche—purely as a suggestion treatment.

We could multiply these examples and could cite cases in which the improvement passed through various stages, explainable by the state of the patient's mind.

When in the course of a test for hearing the patient fails to hear some words, he is greatly discouraged and his deafness seems to have increased in intensity. This has already been reported by Eitelberg[1] and shows at once the influence of the psychical state upon deafness.

Sometimes it will happen as in the re-education of an abasic astasic that the patient has a fall. This fall destroys his confidence, the phobia reappears, interfering with the cure.

Is it not explainable upon psychical grounds that there may be improvement of hearing on one side when an operation is done on the other?

In resume, there often exists in nervous people who have an ear affection adventitious psychical trouble which augment the real deafness in a variable degree.[2] We meet more rarely with pure psychical deafness.

This is not hysteria of the ear and these patients do not present any stigma of this neurosis—it comprises a class of nervous impressionables who belong to the great family of neurasthenia, aboulia and phobia.

Sometimes the improvement which we obtain by various methods of treatment are only due to the disappearance of the superadded trouble. We act by unconscious suggestion. The psychical trouble ends by causing a functional trouble, a certain inactivity of the auditory nerve and of the nerve centers and the methods of re-education act upon the functional trouble by awakening the auditory attention.

The method of Urbantschitsch is a triumph of otologic etiology, either by means of tuning forks or sirens. This special therapeutics has formal indications which are important but it only applies to particular cases. We can draw from the cases a practical indication.

If it has been prolonged for weeks and months by useless catheterization, it is then necessary to look for a nervous ele- after the last time we saw her), she had an intense fever (102 F. in the axilla) and at the same time she suffered a ment in the deafness which we are treating.

We do not tell a nervous patient that there is nothing the matter and we must not show in a definite manner that we are using this method of treatment upon one suffering from auditive aboulia or phobia.

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[1] Eitelberg—De influence de la neurasthénie sur les affections de l'oreille. Ann. des mal. de l'oreille, 1893, p. 835.

[2] Gellé Trois faits de trouble de l'ouie liés a une nevropathie, Ann des mal de l'orelle, 1892, p. 924.

These patients are already induced not to use their ears and we will often, very often, be of service in getting them to use their ears and in causing by aural training, by suggestive encouragement, a disappearance of the psychical element superadded to their true deafness, against which we are too often powerless. We should not forget that it is only the worst of the deaf who cannot hear and that we may treat in an effective way the diseases of the will by suggestion and re-education.

XXXVIII.

ACUTE OTITIS MEDIA CAUSED BY INFLUENZA IN AN ADULT. NO SPONTANEOUS OR ARTIFICIAL PERFORATION OF THE DRUM. PUS EVACTUATED BY THE EUSTACHIAN TUBE. RAPID CURE OF THE OTITIS. CONSEQUENCES.

By Dr. George M. Didsbury.

PARIS.

History: Mrs. R., 50 years of age, mid-wife, a healthy and strong woman, after several days of sickness (very likely influenza), had severe pains in the left ear on the 19th of December, 1903, at 5 o'clock in the evening, with very marked deafness, very intense tinnitus and at the same time a feeling of fullness, with pain behind the ear. On the next night and the next day no change was observed, but in the evening (that is to say one day after the beginning of the disease), the patient expectorated some pure blood which came from the nose and fell down in the mouth, followed in a few moments by expectoration of pure pus. We must say that the only interesting features of this history were told us by the patient and that if we believed them, it was on account of her medical knowledge and her veracity.

An immediate relief of the ear symptoms followed this evacuation, relief from the pain, the feeling of fullness and the tinnitus. The next morning the patient spit up pure pus without any blood.

December 25th, the relief of the ear was in proportion to the evacuation of pus which continued. The hearing was a little better. The mastoid pain, which had been very great in the beginning, was less acute the day after and could not be elicited even on pressure upon the bone.

Ear Examination: The drum was red and bulging; no perforation, no pains in the external ear. We did not think that a paracentesis was indicated in view of the rapid relief of all the symptoms. Dressings soaked in hot water were applied on the ear and on the neck and a catheterization was prudently done in the deaf ear which brought some relief.

December 23. The nasal discharge still continues and the patient blows pus from her nose and expectorates pus. The mastoid bone continues painful and on the day before was somewhat swollen. The hearing has improved a little; persistent tinnitus.

During the night of the 23rd of December tinnitus had been accompanied by shooting pains until two o'clock in the morning. The drum is still red and bulging.

December 30th (eleventh day from the beginning). The nasal discharge is progressively diminishing, the hearing is now good. The drum is normally colored in the most important part, except in the superior portion which is still red.

The treatment has been as simple as possible; only liquid vaseline with boric acid and menthol into the nose, with catheterization and gentle inflation of the Eustachian tube.

January 3rd, a small quantity of pus is still blown out. From the 4th to the 11th of the same month every day a vapor of liquid vaseline, was blown into the tuba eustachii. The patient started for Nice the 11th of January with the drum absolutely normal and the other symptoms completely disappeared.

Three months later, we saw our patient again and she told us the following facts: At the end of January (three weeks after the last time we saw her), she had an intense fever (102° F. in the axilla) and at the same time she suffered a great deal about the cheeks, the forehead, both eyes, and had an abundant discharge from both nostrils.

The discharge appeared only a few hours after the pains and the handkerchief was spotted with a green color. These phenomena lasted ten days, during which she did not see a physician and only snuffed up hot salt-water and used vaseline with boric acid and menthol. During this time the left ear, originally affected, did not show any symptoms.

From these facts, the fever, the pain, the abundant discharge from the nose, we had thought that the disease had been very likely a double fronto-maxillary sinusitis, cured very rapidly by itself; for on April 11th, when we saw our patient again we could not find any symptom of sinusitis; no pus in the nose; the illumination was perfect; there were no pain and no perturbation of the eyes. However the mucous membrane of the right and left turbinated bone was red and swollen especially the left side.

April 25. Again our patient had some fever and pain in the left side of the nose; the left turbinated seemed to be the seat of an absess; it was red and swollen. The opposite side was normal. A few days later, the patient blowed a spoonful of bloody pus from this nostril; complete cure a few days after. It had been impossible to see the hole by which all this pus could escape. At last, as a final episode of secondary infection a small boil appeared at the nasal vestibule. A few days after this, spontaneous evacuation occured and without any treatment, it entirely disappeared.

Conclusions. The most remarkable point in this story was the spontaneous evacuation of the otitic pus by the Eustachian tube and the rapid cure of this otitis media acuta.

The improvement obtained at the outset had been so marked that we did not at any time think it advisable to do a paracentesis. The affected ear was cured or seemed to be cured completely in three weeks (short time even for an aural affection, generally speaking).

If the question as to the ear seems to be solved, it is not the same if we consider the consequences which appeared a few days after the cure of the ear trouble. Though, in our particular case the consequences were not dangerous and the cure obtained without intervention, it may be asked if it would always be the same and if the surgeon who sees an otitis media acuta spontaneously emptying in the Eustachian tube ought not to perform a paracentesis, to make the pus take the right way, that is to say, the external canal.

We know, indeed, that the Eustachian tube opens at the superior part of the drum, and then extends to the superior wall; in that case the evacuation is probably produced when the drum is filled with pus, or when the Eustachian tube is wide or when an anomaly exists.

An objection that one may make, that the paracentesis apparently useless, is that the pus which chooses the Eustachian tube as a drain pipe will always use that same way even if it was running through the external canal. But under these circumstances, if in spite of a paracentesis, infectious local disease appears, the otologist will have nothing to regret.

One may object also that the pus may be especially virulent and that this virulence could be previously estimated, but we must point out that these evacuations occur generally out of the view of the surgeon and are often unknown to him, that the pus which is expectorated into an handerkerchief and mixed up with blood or other secretions makes all bacteriologic inquiries difficult and doubtful.

Rue de l'Arcade.

XXXIX.

EXAMINATION OF THE EARS OF RAILWAY ENGINEERS AND FIREMEN IN RELATION TO THE LENGTH OF SERVICE AND THE FUEL EMPLOYED IN ROUMANIA.*

By Dr. M. Costiniu,

PHYSICIAN TO THE ROUMANIAN RAILWAYS.

The works of various authors, such as Moos, Zwaardemaker, Schwabach, Guye (of Amsterdam), Pollnow, Gradenigo, Bloeckaert, Castex and others, communicated to different Railway and Navigation Congresses and International Conferences, have thrown a clear light upon nearly all that relates to railway engineer and fireman and the organs of hearing—the influence of these professions upon hearing, with all consequences. Little can be added, but peculiarities which I have observed in Roumanian engineers and firemen appear interesting to me, and I have the honor to lay them before you, asking your opinion or decisive action if you deem it necessary.

Up to the present all authors, at least those familiar to me, have concerned themselves with most causes which induce diminution of or defective hearing through locomotive service, but I have never known them to investigate the influence upon the hearing of the different fuels employed.

With us, up to 1888, wood and coal only were employed for firing, especially wood. In that year the machines began to be changed for the use of crude petroleum, and later, in 1896, the joint use of crude petroleum and coal. At the present time we have 9 engines fed with crude petroleum, 234 with petroleum and coal, and 139 with wood and coal.

Considerations of an economic character have led our engineers to employ this combination. As our country produces oil they regard it as less expensive and more convenient.

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*Communication to the Eighth International Congress of Otology, Bordeaux, August, 1904.

Russia has furnished an example. Since the introduction of crude oil as a combustible, nearly all the engineers and firemen complain of the great noise made by this fuel and claim that it has a bad effect upon hearing, vision, and even upon the nervous system.

To convince myself of the truth of these affirmations. I undertook a series of journeys upon the engine, both with ordinary and fast trains, for distances of 56 to 260 kilometers, lasting 2 to 6 hours. To make comparisons and draw conclusions. I rode upon engines fired with the various fuels mentioned. All these journeys were made with the engineer and fireman to the terminus. I examined their ears and noses upon leaving, arriving and returning.

The first journey was one of 56 kilometers, taking two hours. The machine was fired with crude oil and coal. Coal in small quantities was thrown in every 3 to 5 minutes to spread out and re-enforce the heat. En route I immediately took note of the very intense noise produced by the burning of the oil.

The noise was so great that I could not understand the engineer except by approaching him to 10 or 15 cm. and speaking loudly. Aside from this noise there was also another produced by the whistle, which was strident, increasing with each stop of the train. The Westinghouse brake made still another, resembling that of a rocket. Imagine all those noises, combined, or alternating with that made by the vibration of the machine itself, and you can form an idea of the resulting discord. Because of these multiple noises the go-ahead signal of the conductor by whistle or bell could not be heard, so that the engineer always had to look at the conductor who was obliged to signal with his hand by day and a colored lantern at night.

I asked the conductor to approach nearer to the engine, and only at a distance of 10 to 12 meters could he be heard.

During the run I asked the conductor to give signals from coaches more or less near the locomotive, with bell or whistle, but it was impossible to hear anything.

The noise appeared to me more intense as we progressed, so that upon arrival I could not well stand upright; the noise was continually in my ears; the auditive acuity was diminished.

The engineer and fireman felt hardly any inconvenience except the noise in their ears. They told me that after ten or fifteen minutes they felt nothing else abnormal.

At our departure I had examined the ears of the engineer and found the right normal. The left drum was opaque. Whispered voice was heard at 5 meters on the right and 3 meters on the left. The watch tick was 1.50 meters on the right, and 80 cm. on the left. The nasal mucosa was slightly congested.

The fireman, who was younger, showed nothing.

On arriving I examined them again and observed only congestion over the handle of the malleus, more pronounced in the engineer. His hearing was diminished but not the fireman's; the nasal fossae were full of dust.

I felt constantly ill at ease with vertigo and a tendency to vomit. A rest of 20 minutes restored me. Half an hour later I again examined the ears of my subjects and found that the congestion had almost completely disappeared.

After a rest of 7 hours we returned, and on arriving I observed the same thing.

Where the track was down grade and the train sped on with its acquired momentum, the oil cocks were shut off, the noise instantly ceased, and I had a very agreeable sensation.

Four days afterward, I made another journey of 198 kilometers on a fast train in 4 hours.

Proceeding as in the first case I observed the same thing but to a less degree. I attribute this to the fact that on the one hand I had become accustomed and on the other hand that the noise made by the burning oil, the Westinghouse brake and even the whistle were not so loud. It was explained to me that noise made by the combustion of the petroleum is louder when the coal is not uniformly distributed over the grate, thus allowing a stronger current of air.

The third journey (5 hours) I made on an engine fed only with wood and coal. Here I was very comfortable; there was only the sound made by the vibrations of machine itself. The membrane showed little congestion over the handle of the malleus.

The fourth trip I made in the night on a fast train for 260 kilometers in 8 hours. The locomotive was fired with crude oil only. The noise was more intense than in the other trials. It was almost impossible to understand words, and signs were used. Besides the annoyance previously mentioned, there was another when the door of the fire box was opened to regulate it, the light was so bright that immediately after and for 20 or 30 seconds one could not see.

Upon arriving I was weak with the fatigue and noise. The engineer and fireman being accustomed were less so. Their drums were somewhat congested and their auditive acuity diminished one third. After a rest of 15 hours their drums were almost normal, and hearing regained.

Such are the facts observed. It might reasonably be expected, a priori, that the noise made by this fuel would be harmful to the hearing and the nervous system. The repeated congestion of the tympanum and the vibrations of the machine ought to induce certain and rapid deafness. But the facts are not thus, as the following will show:

Dr. E. Clement, the physician-in-chief to the Roumanian railways, cognizant of the complaints concerning the fuel employed, suggested to the managment a periodical examination of the vision and hearing, every three years. We have taken as normal the person who can hear whispered voice at 5 meters and the watch at 80—100 cm.. Examinations were made by local physicians and they were required to send to the central bureau any employe who had the slightest defect of hearing or sight. Here after careful examination the case was decided. This test, made for the first time in 1901, upon 902 engineers and firemen, showed only one engineer and one fireman to have pronounced deafness and tympanic sclerosis. But these were over fifty years old and had been more than twenty years in the service. They were laid off. We also found two engineers, aged 45 and 50, in service 16 and 18 years, in whom whispered voice was heard at 50 cm. and the watch, applied to the ear. As their general condition was good they were given work which did not imperil the public.

We have found 52 agents whose hearing was slightly impaired, either in one ear or both, but such that they could remain in the service. To be on the safe side, it has been ordered that these agents be re-examined every six months. At these examinations we found only two whose hearing had diminshed; the others were stationary, some even improved as the result of treatment.

This year (1904) a new examination has been made and we have found 8 more agents with slightly impaired hearing, who will undergo tests every six months.

Of the 902 engineers and firemen 637 were in service when the change to crude oil was made; only 265 entered after that date, 1896.

Of these latter at the examinations made in 1901 and 1904 we found only 8 with the slightest impairment; these are permitted to continue in the service on condition of reexamination every six months. Two of them were discovered this year and six in 1901. In the latter hearing has not changed since between 33 and 36; the others were from 40 to 59 years of age..

Comparing the percentage of old and new agents, that is to say before 1896 and after, we find that 8 per cent of the former and 3 per cent of the latter have alterations of hearing. But we must remember that the former have been in service at least ten years, the latter not more than eight. The age is also to be considered, 5 of the 8 being over 40. This also applies to the agents, who are over 45, as wel as in the service longer.

The employment of this fuel being relatively recent with us, we cannot draw definite and infallible conclusions; however, from our observations we may say:

1. Comparing the three kinds of fuel mentioned, it is incontestable that, so far as hearing is concerned wood and coal are preferable to crude oil, unless some mechanism is devised to lessen the intensity of the noise made by the latter.

2. The noise made by the combustion of petroleum is more intense when employed alone, and when the coal is not evenly distributed over the grate.

3. This noise together with that made by the machine itself, the whistle and the Westinghouse brake is capable of accelerating the evolution of ear affections in those predisposed if neglected. Intemperance may be added to this.

4. Habit plays an important role. They become so accustomed to the noise that it seems abnormal not to hear it.

5. Another factor in their favor is that the congestion observed during the journey does not persist. After 20 or 30 minutes it disappears, and after a rest of a few hours everything is all right.

6. It is necessary that the auditive acuity be good, especially to hear the derangements of the machinery which may take place, because we have elsewhere seen that the noise is so great that one cannot understand either the bell or whistle, only petards.

7. It appears that the impairment of hearing depends rather

upon age and the number of years of employment upon the engine.

8. The burning of crude oil may, more rapidly than other combustibles, predispose to neurasthenia and dimness of sight.

9. The time in which these observations were made is too short to draw numerous or precise conclusions; however, at the moment the facts observed appear to me interesting enough to engage your attention.

I will continue my observations and when I have more numerous data and new facts I will make them known.

XL.

FURTHER INVESTIGATIONS INTO THE DIAGNOSTIC SIGNIFICANCE OF THE POTASSIUM SULPHO-CYANIDE REACTION IN THE SALIVA OF PATIENTS WITH EAR AND OTHER DISEASES, AS WELL AS THE OCCURRENCE OF PTYALIN IN THE SALIVA OF PATIENTS WITH EAR DISEASES.*

By Dr. Edwin Jurgens.

The author reviews the literature bearing upon this subject, also the chemical reactions of potassium sulpho-cyanide (Rhodankalium). In his earlier investigations he collected the saliva on a cotton pad, but in his later work he has used Heidenhain's saliva tube, which he introduces into the duct of the glands. The author always uses the reactions of Treviranus and Solera. These reactions are as follows:

1. Treviranus combines the saliva with two to four times the amount of alcohol, slighly warmed, filters and evaporates the alcohol. To the residue he adds ferric chloride ($F_2\ Cl_6$) and hydrochloric acid (HCl). If positive, a deep blood red color appears, which does not disappear by heating, but does disappear on the addition of a solution of mercuric chlorid ($Hg.\ Cl_2$). It is necessary to exclude the possibility of any other organic acid as acetic, formic, salicylic, and especially meconic, which is found in the saliva of opium users.

2. Solera uses a saturated solution of Iodic acid (HIO_3) or what he thinks is better, iodic acid powder, with a starch solution. This gives a blue color in the presence of potassium sulpho-cyanide. In explanation of the resulting reaction, Solera gives the following chemical formula:

$$5\ K\ C\ N\ S + 7\ H\ I\ O_3 = 5\ K\ H\ S\ O_4 + 5\ C\ N\ I + I_2 + H_2\ O.$$

The following conditions should be taken into consideration in using this reaction for human saliva. Does the patient smoke, or use bitter-almond, cherry or opium preparations?

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*Abstracted from the Monatsschrift für Ohreñh, May, 1904, by E. E. Foster, M. D., New Bedford, Mass.

The smoking of cigars, cigarettes and papyrus, but not the chewing of tobacco, increases the reaction, as does also the use of bitter-almond and cherry preparations. The use of opium does not change the quantity of sulpho-cyanide, but disturbs the iodic acid reaction.

Muck (Munchener med. Wochenschrift 1900 No 50) was the first to report investigations touching the alteration of the quantity of potassium sulpho-cyanide found in the saliva of patients with chronic middle ear inflammation, with the idea of the inflammation affecting the chorda tympani and plexus tympanicus, and thence the salivary glands.

In March, 1901, the author published in the Russischen Wojenno Medicinski Journal the following conclusions as a result of his first investigation:

I. In otitis media chronica purulenta of one or both ears the reaction for sulpho-cyanide was negative.

II. Acute and subacute inflammation of the middle ear, with severe course, reaction negative.

III. He has positive results (a) In all patients without middle ear disease. (b) In acute inflammation of the middle ear with good recovery. (c) In subacute, without severe symptoms.

IV. He also has positive reactions in cases with destruction of the middle ear and especially of the mastoid.

V. One case of otitis catarrhalis gave positive results.

VI. Positive reactions in dry perforations of the drum.

VII. The reaction cannot with certainty be foretold by an examination of the ear.

VII. The reaction can be used as an aid in making a prognosis; bad when the reaction grows weaker from time to time, good when the reverse occurs.

Alexander and Reno published October 16, 1902, (Wiener klin. Wochensch.) their observations on the value of the reaction in 85 cases with ear disease, with following conclusions:

I. The potassium sulpho-cyanide reaction in the saliva of patients with ear disease is of conditional diagnostic value.

II. There is no reaction immediately after a radical mastoid operation. It appears usually four weeks after the operation and indicates a good recovery.

III. A destruction of both tympanic plexuses can produce a permanent loss of the reaction.

IV. The reaction has no prognostic value.

Alexander and Reno also found that external diseases of the ear have no influence upon the salivary glands, and that a disease of one ear can produce a decrease in the quantity of sulpho-cyanide secreted by the glands of the opposite side, probably by a connection between the tympanic plexuses of the two sides.

The author reports in his present paper 53 cases with ear disease and 28 cases with other than ear disease, such as pneumonia, typhoid, acute articular rheumatism, empyema, etc., all with negative reaction, while erysipelas facialis, influenza, and anemia gave positive result.

The author arrives at the following conclusions as a result of his last investigation:

I. When sulpho-cyanide is fonnd in the parotid saliva of the diseased side, it is quite certain that the corresponding middle ear is sound or only slightly affected.

II. Complete absence of sulpho-cyanide in the saliva of a patient with ear disease is a good proof that the middle ear is badly involved and chronic in character, of course other causes for a negative reaction having been excluded.

III. The weakening of the reaction shows, in accordance with the degree, a more or less severe condition of the corresponding side, and is a good indication of the severity of the disease.

V. In an apparently healed middle ear inflammation, if the reaction does not appear, it signifies a) that the tympanic plexus is completely destroyed or b) that the disease is really not healed and sooner or later will again appear, and c) a recurrence of the reaction, that the disease process in the middle ear has certainly ceased.

VI. In cases where the middle ear cannot be seen, the reaction is of value in making the diagnosis and prognosis of the disease.

VII. The presence of ptyalin in the saliva does not depend upon the action of the tympanic plexus, and is quite independent from sulpho-cyanide in its production.

Where sulpho-cyanide failed (in the cases reported) ptyalin was always present.

The author made the same observation as Alexander and Reno, that in severe middle ear affections of one side, the reaction in many cases failed on the sound side. He accepts the explanation of Alexander and Reno.

XLI.

THE NECESSITY FOR OBLIGATORY INSTRUCTION IN OTOLOGY IN THE UNIVERSITIES.*

By Professor G. Gradenigo.

Such a large congress as ours, in which the aurists of the entire world take part, could have no more worthy aim than to concern itself with the practical state of our specialty, and consequently with the efficiency of the otologic instruction in our Universities.

Everybody who examines, without preconceived ideas, the actual state of medical instruction is struck by the fact that the pathology of so important an organ as the ear has been removed from the schedule of compulsory studies; in other words that it has been deprived of its only efficacious sanction, compulsory examinations. Everyone knows that to make a specialty an elective, is to assign to it a limited value. The student in the midst of what he has to do, is unable to select subjects which will be truly useful from a professional standpoint, and he devotes all his time and energy to those which are classed as indispensable, without concerning himself with the others. So, in spite of the efforts of conscientious teachers, who possess the more merit since they labor under unfavorable conditions, most young doctors on leaving the universities, possess the most elementary ideas on otology. The wonderful progress of this specialty, and the frequency and gravity of aural affections make the contradiction between university instruction and the demands of practice inexplicable and flagrant.

The causes of this fact are many; we will first mention the relatively recent date that otology asserted its autonomy, then the isolation in which these rare specialties have been for a long time, remaining strangers to the hospital movement, and so to speak holding themselves aloof from the professional life of large centers. We must also remember that there was a lack of therapeutic results obtained by aurists, who did not see the patient until the disease was too far advanced, and that surgery was far from being as successful as now. Finally, there is the systematic opposition of general surgeons, who saw, with displeasure, otology detach itself from surgery, imitating ophthalmology at a distance of a few years. Finally, the most important cause is the fear inspired in human nature by all that is new.

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*Read before the International Congress of Otology, Bordeaux, August, 1904.

Thus, by the force of inertia, and to continue tradition, our faculties of medicine, with certain exceptions ignore modern otology. The aurists have been carefully removed from university courses, and the otologic clinics which exist for the most part, lack assistants, clinic material, sites and laboratories, as opposed to certain other specialties that are far less important to the young physician than otology.

The inconveniences resulting from actual insufficiency of university instruction in otology are of different kinds. In the first place, the patients resent the lack, in their physicians, of knowledge of otitic prophylaxis, diagnosis and therapy. To know the means only of prophylaxis and treatment, which are very simple and within reach of every physician, is usually sufficient to check progressive deafness and severe aural suppurations, often dangerous for the life of the patient. Without exaggeration, we may state that it is possible to see daily the disastrous results of this ignorance, as shown in cases of deaf-mutism, incurable deafness and even death, which should have been prevented. With these facts in mind, the aurist feels a legitimate sense of pity and scorn, while the public and the physicians themselves, through respect for tradition, suffer them as a fatal, unavoidable evil. We ask how long will the authoritative voices be silent, which are able to show how these misfortunes are due not to fate but to negligence. How long will the authors of these disasters, assured of immunity, continue to cause such misfortunes?

The doctor, ignorant of otology, in the presence of a patient consulting him for an aural affection, has the choice between modestly admitting to him his incompetence and sending him to a specialist, or of undertaking some treatment, whose indications and results he cannot appreciate. How long will the doctor be honest enough to choose the first alternative and voluntarily renounce the profits of curing a new patient, especially now when the medical profession is actually undergoing an economic crisis?

The elective study of otology in the universities, and consequently the secondary rank occupied by otologic clinics, as opposed to those of obligatory specialties has plainly affected the dignity of otology. The secondary position of official instruction has evidently its excuse in the multiplication of pseudo-specialists, who favored by the absence of regular control, practice among the public on the strength of their claims and by frauds, which are renumerative but if not dangerous are at least useless. No one is ignorant of the wrong done to the patient and to the dignity of our studies by these unscrupulous fellows.

One of the most weighty objections raised against the institution of compulsory otologic examinations, even by those university professors who recognize in all sincerity the importance of that study, is the number of studies that the student of medicine must take during the last two years of his course. "How is it possible," they say, "to add another to the list?" The objection has some value, but does not justify the ostracism of such an important branch as otology; furthermore, it is evident that the regulations in regard to the curriculum of medicine should be changed from the way they have been for thirty years.

As with otology, so laryngology and pediatrics have acquired the right to be named in the curriculum in the future, these different specialties will be represented, not as they are at present, according to the more or less recent epoch of their autonomy, but according to the importance acquired in our days by their votaries. Of course the student, who is to receive general ideas, must not undertake the complicated methods of examining and operating on the ear, but only those parts of the specialty which it is necessary to know in his practice. Likewise in other specialties, they actually teach the student too much; for example in ophthalmology, how many practitioners ever make a cataract or plastic palpebral operation? Will a physician have more occasion to treat an insane patient than one with an acute otitis?

In asking that the example be followed of other lands that make instruction in otology compulsory in the universities, we mean only instruction in what the students will require in their practice. This will be easy to give in a single semester.

Resolutions have already been passed at many of our reunions, but we must not be discouraged because they have not succeeded. Each year will add to the value of our arguments, and will diminish the number of sceptics and opponents. Already, otologic instructions has been declared compulsory in Norway and Spain, and similar progress has been made elsewhere. There is hope that the logic of events will finally make an impression on human inertia, but all should co-operate to aid in this progressive movement, and I move the appointment of an international commission, for the purpose of studying and putting into execution the most opportune means of obtaining compulsory otologic intruction in the universities.

XLII.

OSTEOPLASTIC OPERATIONS ON THE FRONTAL SINUSES FOR CHRONIC SUPPURATION.

By Dr. Rich. Hoffman,

HEAD PHYSICIAN AT THE CHILDREN POLICLINIC AND THE HOME FOR INFANTS AT DRESDEN.

Whenever the question of operating on the facial portion of the skull comes up, we must be careful not only to thoroughly remove the focus of disease, but also to cause no deformity, or at least as little as possible.

These facts are naturally of importance in operations which are undertaken to cure a stubborn suppuration of the frontal sinus which can be cured in no other way and which is annoying or dangerous to the patient. The chronic suppuration of this cavity is the only one to be taken into consideration and whenever an operation is necessary, a small opening—½-1 cm. long—in the anterior wall of the sinus is sufficient for cure, and this never causes deformity.

The first and chief indication, the removal of the diseased focus, is found in those frontal sinus with diseased mucous membranes.

Since very frequently the affection of the mucous membrane is complicated by a similar affection of the ethmoid labyrinth, especially the anterior, a rational therapy must take this fact also into consideration or the result will not be favorable.

The frontal sinus has often a very complicated structure. It may be divided by septa into numerous inter-communicating cells. The extension of these posteriorly over the roof of the orbit is important. The so-called "orbital recess," caused thereby, may extend as far as the small pterygoid process of the sphenoid. Similarly, the frontal sinus may extend a considerable distance upward into the frontal bone, and also a considerable distance toward the temporal. The ethmoid cells sometimes protrude into the frontal sinus.

In order to remove the pathologic mucous membrane thoroughly from every cell and recess, which is necessary to affect a cure, it is necessary to obtain a good view of th frontal sinus. Many patients are so alarmed at the idea o having suppuration, that they desire to be relieved of it at any cost.

The second indication is osteoplasty, that is, to remove the anterior wall of the frontal sinus temporarily, and then replace it, while the other methods in which one or more of the sinus walls are completely removed, always leave more or less of a deformity. In regard to the osteoplastic method, I will go more into detail.

In this method, we distinguish between temporary resection of the anterior wall of the frontal sinus, and the formation out of it of a skin-periosteo-bone flap.

According to the literature, the temporary resection of the anterior wall was done first by Brieger (Archiv. f. Ohrenheilkunde, V. XXXIX., p. 213), with good success. The author does not give the result of the case.

I find a description of a method of this kind by Kocher (Technique of Operations, 3d Edition, p. 65), and likewise one by Hajek (Pathology and Therapy of Inflamamtions of the Nasal Accessory Sinuses, 2d Edition, p. 189).

The method of Kocher is as follows: After shaving the hair, a semicircular incision is made through the eyebrows down to the bone, as far as the median line. The frontal sinus is opened by means of a chisel. Through this small opening, the extent of the cavity upwards and laterally is made out. Then from this point, the bone is cut through by a straight chisel, first laterally and then upwards. The triangle of bone, thus formed, together with the periosteum, is broken off by an elevator and turned back. After everything diseased is removed, the operation is completed by drainage towards the nose, iodorform gauze támpon and temporary suture, and two days later, a secondary, permanent suture.

According to Kocher, it is seldom necessary to add a vertical cut to the horizontal one. Hajek, on the contrary, always adds it, making it correspond to the currugator fold. The height of the incision is determined by the Roentgen picture of the sinus, which is always taken before the operation. It is of special importance to make the incision a little internal to the median border of the sinus, since when the cutaneous wound lies on the border of the bony wound caused by the chiseling, there arises later a linear depressed scar. After the cutaneous incision has been made, and the chiselled opening of the sinus at the most inferior part of the anterior sinus wall has been carried out, the bone is chiselled through horizontally and vertically, as nearly as possible exactly at the border of the sinus. The line in which the bone is chiselled corresponding to the perpendicular cutaneous section is never exactly perpendicular when it corresponds to the arc-shaped boundary of the frontal sinus, but is more or less convex upwards according to the size of the cavity and the position of the septum. The softer parts of the flap to be resected must be correspondingly undermined.

Similarly the softer parts must be undermined upwards from the external end of the horizontal * cut, and whenever possible the chiselling here must also be made at the margin of the sinus, so that at the end, the whole bony flap is joined to the frontal bone by only a small bony bridge, and can therefore easily be broken upwards and outwards by an elevator. After everything pathologic has been removed from the frontal sinus, that of the ductus naso-frontalis must be removed. Through this a sufficiently large drainage tube must be inserted into the nose so that after the resected bony flap has been replaced, the secretion has an uninterrupted flow from the operated sinus into the nose. Since the ductus naso-frontalis is rarely large enough for a suitable drainage tube, it must be artificially enlarged. For this, it is sufficient to scrape the walls of the duct with a sharp spoon, when the stenosis is caused by proliferation of muco-periosteal covering. This is usually, however, not the case, and therefore the duct is not made large enough by such a scraping to guarantee suitable drainage into the nose. Furthermore, the enlargement of the duct should serve to thoroughly remove the ethmoid cells that empty into the anterior part of the infundibulum. For these two reasons it is better to enlarge the exit artificially. Hajek does this in the following manner: First the spina nasalis superior, which projects towards the osteum frontale, is chiselled away in the direction of the sinus. Accompanying this, the anterior part of the middle turbinate is removed, that is, the internal bony wall of the ductus naso-frontalis. The portions of bone chiselled off are removed partially through the sinus and partially through the nasal cavity. When the ductus naso-frontalis

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*Hajek makes the main horizontal incision from the inner end of the eyebrows to the external third of the same down to the bone.

has thus been enlarged, a part of the anterior ethmoidal labyrinth can be reached with the chisel without difficulty.

In the wide exit thus formed a rather thick drainage tube is inserted, which both Hajek and Golovine (see below) let remain in situ for 6 to 12 weeks. In order to fix the tube in position, a thread is carried from its upper end through the wound and fixed in the skin. After the drain is removed, the exit is for a few weeks touched with a 5 to 10% silver nitrate solution to favor the ingrowth of epithelium into the sinus. Hajek sutures at once and allows the first bandage to remain in position 8 to 10 days unless severe pains or great swelling of the soft parts necessitate an earlier change. In the second week a slight dressing is used; in place of the suture by which the thread from the upper end of the drain is fixed, a piece of court plaster is used.

The formation of a skin-periosteum bone flap from the anterior wall of the frontal sinus seems to have been carried out first by Schönborn (Wittkop, Dissertation, Würzburg, 1894, page 36). The incision was of such a kind that the sinus was opened by a skin-bone flap. The details of this are not given. By means of the chisel and elevator a piece of bone about two cm. in diameter is lifted up and is left hanging to the flap, and thus the right and left frontal sinuses were opened. Evacuation of both sinuses, probing of the right ductus naso-frontalis, tamponing of the cavity with iodoform gauze. This was removed the third day after the operation and the skin-bone flap was fixed by silk sutures. First intention. Discharged ten days later. Additional particulars not given.

Czerney operated in a similar case (Transaction of the German Surgical Society, 1895, Vol. II, page 213). An arc-shaped incision over the glabella, convex downward, formed a skin-periosteum flap, whose base lay in the middle of the forehead. After the incision had been made to the bone, the latter was cut through with the chisel at the level of the right frontal sinus, and the anterior wall of the cavity, together with the skin-periostum flap, was turned upwards. After evacuation of the sinus, the duct was widened. Drain wound kept open for a time with a tampon. Healing of bone flap in four weeks. About one and a half years later patient reported he had been well since the operation, had felt no pain in the frontal sinus, and was able to work all of the time.

About that same time Dr. Volkowitch exhibited a patient, operated on in a similar manner, before the Sixth Congress of

Russian Physicians, at Kiew, April 25, 1896, (cited by Golovine, Transaction of the Moscow Congress, Vol. VI, page 219).

Golovine described another case before the Moscow Congress, 1897 (Transaction, Vol. VI, page 221).

Four cm. incision along the inner half of the eyebrows on the upper border. 'At its internal end, a second oblique incision in the corrugator fold. The two incisions formed a T and reached to the periosteum. The soft tissue forming the upper border of the wound was dissected off and turned backwards, and a curved incision was made in the periosteum, whose lower border, two cm. in height, was formed by the inner third of the orbital ridge. The dimensions of the curved periosteal incision depends on the size of the opening which it is desired to make. Corresponding to the curved periosteal incision, the bone is chiseled through as far as the diploe, and bone is then broken through by a small, flat and very broad chisel, held obliquely, without the danger of entering the cranial cavity. The piece of bone obtained thus from the anterior wall of the sinus can then be turned back and a clear view of the cavity is obtained, so that it can be curetted. A drain is placed in the nose, which remains two months and often longer. Primary suturing.

Golovine was able to report a case as cured after nine months. In regard to the cosmetic effect he says: "As far as the looks are concerned, we have obtained perfect results; no deformity, scars hardly visible."

My own operations on the frontal sinus comprise forty-six cases, of which thirty-eight were chronic and eight acute. Eleven of the chronic and one of the acute were bilateral suppurations.

In the eight cases a simple opening with drainage outwards and subsequent cleansing of the cavity was sufficient for healing. Twice drainage through the nose also was employed.

Of the thirty-eight chronic cases, twenty-six were operated according to Kuhnt; in four cases (one bilateral) the anterior wall was temporarily laid back, after Kocher's method; in eight cases (two bilateral) there was an osteoplastic operation.

Of the thirty-eight chronic cases, in twenty the ethmoid was also diseased, and of these in seventeen cases (four bilateral) only the anterior cells were involved, while in three cases (one bilateral) the middle and posterior cells were also affected. In the last cases in order to get at the diseased ethmoid cells, the nose was once paramedianally incised and once laterally.

In the third bilateral cases, the ethmoid was attacked from the orbit. In one case of bilateral disease, where a good view could be obtained of the duct and the diseased anterior ethmoid cells, the processus frontalis of the upper jaw and a part of the inferior wall of the frontal sinus was resected on both sides, after Killian (Archiv. f., Laryngologie, Vol. VIII, No. 1).

In fourteen of the above twenty cases, the maxillary antrum was diseased at the same time as the ethmoid (four times bilaterally).

Twelve cases were only frontal and maxillary sinus suppuration (three times bilaterally). In six cases (twice bilaterally, of which one was a bilateral traumatic suppuration) the frontal sinus alone was involved. Three acute cases were complicated by a maxillary sinus suppuration.

In regard to the results, the acute cases, as indicated above, were all cured, and the cure has lasted several years.

Of the 26 cases operated after Kuhnt's method, 16 are to be regarded as cured, and the cure has lasted several years.

In three cases (one bilateral) the cure lasted one year; a longer control was not possible. One bilateral suppuration, after the treatment, went to another doctor. Two bilateral cases died, one from a brain abscess, the other from some intercurrent disease.

In regard to the osteoplastic operations, two cases of temporary reflection (according to Kocher's method) were cured, one for four years, the other for more than two years. The treatment of one case operated in this way is not yet concluded.

Three cases of osteoplastic treatment have remained cured for a year or nearly a year; one died of meningitis. Four (two bilateral) are still under treatment.

In regard to the complicating suppurations, four of the cases operated according to Kuhnt still discharge from the maxillary sinus (boring into the alveolar process, no radical operation) and in three cases from the ethmoid.

The comparison of the cosmetic results of the cases operated according to Kuhnt's method with those of osteoplastic opening of the frontal sinus shows that the latter is by far the best. This can be easily seen from the photographs.

As can be easily demonstrated by performing the osteoplastic operation, the operator thereby obtains a fine view of the sinus and thus can thoroughly remove all diseased tissue. If Hajek's method of enlarging the exit by removal of the spina nasalis superior is adopted, there is an easy path to the ethmoid. If this does not give a sufficient view of the exit and ethmoid, the processus frontalis of the superior maxilla can be resected, according to Killian, as I did in one case. If the ethmoid is extensively involved, the usual treatment for this can be added to the osteoplastic operation.

The careful removal of all foci of disease not only causes a complete cure, but prevents a return.

The sinus cavity after the osteoplastic operation has a different state from that after those with a resection of its walls. In the former the cavity is on the whole well retained, while in the latter it is more or less obliterated.

Therefore, as Hajek also said, it is necessary to have a wide drainage way towards the nose, which is obtained by enlarging the exit, and also to allow the drain to remain as long as possible, as Golovine also recommends.

In this way not only does the connection between the sinus and the nose remain a wide one during the process of healing, but it is to be expected that it remains permanently wide. Thus a retention of secretion, which might occur following a reinfection from the nose with a swelling of the mucous membrane, is prevented. Great emphasis should be laid on this enlargement of the ductus naso-frontalis in order to obtain a permanent union of the operated cavity with the nose, as well as on the thorough evacuation of the frontal sinus and the ethmoid when it is also diseased.

In regard to the permanent cure after an osteoplastic operation, I should like to report two cases as cured (v. s.)—strictly speaking, only one has remained cured for four years under continual observation—while the others have been under observation too short a time to allow a judgment to be expressed. Hajek saw four of his cases cured. Golovine saw his cases cured after nine months—too short a time.

As to the permanency of the cure after the osteoplastic operation, we take the same standpoint as Hajek, namely, that a definite judgment will take years.

The number of patients permanently cured is therefore scant.

It is to be expected, however, that if a wide and permanent union with nose has been carefully constructed the result will be good. At any rate, the wonderful results encourage us to try for perfection of technique in order to reach the goal of the best operation.

In the treatment of chronic suppuration of the frontal sinus. my operations developed the following rules.

The treatment of the sinus must first be preceded by a careful diagnosis of whether there is a complicating suppuration of some other accessory sinus. A maxillary antrum affection must be treated first. The ethmoid requires special consideration. The diseased cells, so far as they are accessible from the nose, must be opened and the diseased mucous membrane removed after resection of the corresponding part of the middle turbinate and even the processus uncinatus. Resection of the middle turbinate creates a means of effectively probing and subsequent lavage of the frontal sinus.

The removal of pus by lavage of the frontal sinus is the most positive sign of its disease. In all but five of my cases the diagnosis was made by probing and subsequent lavage. In two of these five, I was unable to get into the sinus and in three the probing gave no results (manifest empyema).

In some of my later cases I have followed the advice of Scheier (Transactions of the Laryngologic Society of Berlin, Vol. VIII, page 35) and others, in having a radiogram of the frontal sinus, taken in order to ascertain its size, and also whether or not it was present. Incidentally, I desire to say that I regard the transillumination of the frontal sinus to be of secondary importance, since I have convinced myself, when I was assistant in Prof. Kesselflar's clinic at Jena, that a frontal sinus with a severe purulent affection may be clear to transillumination. Later observations have only confirmed this judgment of its value.

The methods used by me in the osteoplastic operation on the frontal sinus are as follows: First a horizontal incision from the dome of the eyebrows to the outer two-thirds or end of the eyebrows. The incision does not lie in, but rather immediately under the eyebrows, because I have observed that otherwise the cosmetic results were bad on account of irregular position of the brow, in the formation of a scar. Most authors make the incision through the middle of the eyebrow. Golovine makes it along the upper border. Next comes the incision through the soft parts, then through the periosteum 0.5 cm. from the orbital border. Retraction of the latter as little as possible, and only downwards (The retraction of the periosteum only downward and mesially is to leave the bony flap with as much of a periosteal cover as possible.) Exploratory chiseling of the sinus. From this small opening the extent of the sinus laterally and superiorly is made out by means of the bent probe, as is also the thickness of the wall.

If the wall is thin, I resect it temporaly. For this a second incision in the corrugator fold is necessary, with a mesial reflection of the periosteum. In making the vertical incision it is well to have in mind the advice of Hajek, given above. I carry out the rest of the operation as Kocher advises. If any difficulty is furnished by the reflection of the bone, its base can be made smaller by chiseling the bone corresponding to the superior and temporal border of the sinus (Hajek). The diseased mucous membrane must be carefully removed—this is of the greatest importance—and any partitions in the sinus cavity must be resected. The orbital recess requires special care. The ethmoidal cells that project into the frontal sinus can be easily opened, and under certain circumstances furnish an entrance to the other diseased cells. Finally comes the sterilization of the exit and its enlargement. In doing this diseased ethmoid cells are often encountered, which can easily be evacuated. Lastly, I have enlarged the duct according to Hajek's method. We mentioned above the treatment of the ethmoid cells which could not be reached from the frontal cavity. After the wound has been thoroughly cleansed, a drain is placed in the exit. I use spiral drains of silver wire and a thread or wire is run through its upper end, which is secured externally by a suture. The wound is either sewed at once or two days later. Agreeing with Golovine and Hajek, I leave the drain in position twelve weeks in order to provide an extensive communication between frontal sinus and the nose, not only during the period of healing, but as a permanency. After the drain has been removed the duct is brushed with a 5% silver nitrate solution (Hajek).

If the anterior wall of the frontal sinus is very thick—we found it in one case 0.75 cm.—I make, according to my own method, a skin-periosteal-bone flap out of the anterior wall, by introducing into the horizontal periosteal section a wedge-shaped chisel of a breadth corresponding to the extent of the frontal sinus temporarily. This contains the anterior wall, in its entire thickness only so far as the cavity is opened by the flap, and is distinguished from other methods by the manner of its construction and its composition. The flap is thrown upwards. If it is too small a second can be made near it.

This method of opening the frontal sinus could be called "Osteoplastic Chiselling."

For cosmetic results, and also for the cure (formation of chambers in the cavity by sinking in of the osteoplastic flap, which has been deprived of its bony support) it is necessary that the temporarily resected anterior wall as well as the osteoplastic flap formed from the anterior wall, must fit exactly in the defect or be supported by the surrounding bone.

I have avoided the vertical skin incision in those cases where I formed a skin—periosteal-bone flap out of the anterior wall, in cases of small sinuses, but I have made a subcutaneous incision in the periosteum.

If the case is one of a deep orbital recess, the wound can be left open until the deepest recess has been filled out with healthy granulation, and the skin-periosteal-bone can be replaced later.

If a cure has not been accomplished in this way, the Killian method must be considered, since in addition to the possibility of removing all diseased tissue, it furnishes the best cosmetic results, next to the osteoplastic method.

These operations as well as Kuhnt's (Kuhnt, "The Inflammatory Diseases of the Frontal Sinus," Wiesbaden, 1895) are also to be taken into consideration when the anterior and inferior bony walls are diseased.

On the other hand, an intracranial complication necessitates a complete avoidance of osteoplastic operation.

In bilateral diseases, I made the incision simultaneously on right and left side. According to observations made elsewhere, both horizontal and vertical incisions in the median line give more or less deformity, while those in the lateral wall of the nose and the corrugator ridge are cosmetically favorable.

My conclusions are as follows:

Wherever there is no disease of the bony walls of the frontal sinus, the osteoplastic method of treating chronic frontal sinusitis is to be preferred, since it satisfies all the indications, that is, a sufficient survey of the sinus is thereby obtained, and the treatment of the ethmoid can also be carried out, and therefore all diseased tissue can be thoroughly removed while, at the same time the cosmetic results are good.

In using it, the following must be observed:

(1) That the replaced bony flap must everywhere rest on the surrounding bone, in order to get good cosmetic results

and prevent the formation of recesses that delay healing.

(2) That the connection of the unobliterated cavity with the nose must remain a wide one as this is the surest guarantee against retention of secretions during healing and against reinfection.

A definite judgment as to the value of and the permanency of the cure following osteoplastic operations can be rendered only after years have passed.

XLIII.

OBLITERATION OF THE PHARYNGEAL ORIFICE OF THE EUSTACHIAN TUBE, COEXISTANT WITH ANNULAR STENOSIS OF THE EPIPHARYNGEAL ISTHMUS.*

By Dr. J. Molinie,

Marseilles.

The vestibule of the Eustachian tube, on account of its position, is but slightly exposed to pathologic manifestations, and abnormalities are exceptional. It may nevertheless be subjected to injuries which may cause deformity or obliteration. Traumatisms (unskillful introduction of instruments for therapeutic purposes) and surgical operation may wound the tubes and causes cicatrices of the borders. Several instances[1] have been cited of traumatism by firearms producing wounds of the pharyngeal orifice of the tube. The results of these accidents have been generally atresia of the tube, supervening upon cicatrization of the wound.

There are still other causes of obliteration of the tube. Gruber[2] mentions cysts of the pharyngeal orifice. Boeninghaus[3] observed it following tumefaction of the tube.

We must mention, most of all, specific ulcerations of the epipharynx which in cicatrizing, leave adhesions or fibrous bands which close the pharyngeal opening of the tube. These pathologic manifestations are not so very uncommon and constitute isolate facts.

Rarer still is the method of obliteration which I have observed, characterized by the presence of a sort of fibro-membranous curtain covering the whole of the lateral part of the epipharynx and replacing all the anatomic peculiarities of this region. The fibro-membranous investment attached behind to the epipharynx and covering the lateral wall of the epipharynx was inserted anteriorly to the superior surface of the palate. This abnormal union contributed to form a stenosis of the epipharyngeal isthmus. There has been, to my knowledge, no case in which there was a similar condition of things and as I have occasion to see two cases, I deem it proper to report them.

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*Read before the International Congress of Otology, Bordeaux, August, 1904.

[1] Schwartze—Maladies d'oreille. Vol. II. P 119.

[2] Gruber, Kyste de l'orifice pharyngeal de la trompe. Societe Autrich, 1897.

[3] Monat für Ohrenheilk. 1897. p. 112.

Case 1. Miss D. aet. 27, called upon me on May 17, 1899. Antecedent heredity good. Mother living, father carried away by a surgical affection. From a personal standpoint, there does not appear to be a grave affection present. In infancy she was quite delicate. The patient who was a frequent sufferer from throat disease, was treated with repeated galvanocautery applications. At the age of three she had a severe attack of pneumonia which almost terminated fatally. At the same time she had an acute suppurative otits media on the right side leaving slight deafness which has increased from time to time. Hearing of the left ear was progressively becoming feeble without reason and at the examination it was very poor.

During the year 1897, nasal respiration was slightly embarrassed and as it continued to progress it has tended to cause almost complete suppression of the permeability of the nose. The patient has been operated on for fistula in ano. She suffers with articular pain whenever there is a change of temperature.

Watch test, right 0.04 meter, left 0. Examination showed the tympanic membranes, greyish dull in color, much retracted with the handle of the hammer very oblique, with the short process projecting out.

Nose. During inspiration, the air enters the pharynx but during expiration it can not pass through the nose. From the impossibility of blowing the nose, there is an accumulation of the secretions in the nose. The nasal mucosa is in a normal condition. The secretions are very abundant; taste and olfaction diminished.

Mouth, nothing abnormal; dentition good; no abnormalities of the teeth.

Pharynx, anterior pillar normal; tonsil small and free anteriorly, but posteriorly it is covered by a very adherent fibrous membrane which covers it as a cowl and which fixes it without loss of continuity to the lateral wall of the pharynx. There is no trace of a posterior pillar. The palate has retained its normal form, but is lower than in the normal state. Furthermore, it is absolutely fixed at this place and all movements of ascent or descent are prevented. It is not adherent to the pharynx; a probe may be inserted between it and the pharynx. On each side the palate terminates in a falciform fold which joins the pharynx almost at its origin. The extent of the free border of the palate is reduced to very small proportions. Pharyngeal mucosa is dry, covered with thin viscid secretions. Posterior rhinoscopy is difficult, the space does not permit of sufficient light for the examination of the posterior face of the palate. The very pronounced stenosis of the isthmus of the epipharynx does not permit the passage of the index finger.

A Moritz Schmidt refractor was insinuated into the epipharynx, making a passage about five millimeters wide, by virtue of which I made an exploration of the cavity. I saw that the palate was attached on each side at its superior surface to a fibro-membranous band which on the postero-superior region of the epipharynx forms an investment of the lateral part of this cavity and spreads like a fan, sending most of its fibres to the superior border of the palate, while the others are joined with the pharyngeal mucosa. This membrane had a fibromucous aspect, red in color and of a certain elasticity. It masked completely the orifice of the tube and the fossa of Rosenmüller. Palpation showed a surface smooth and even upon which it is impossible to recognize anything in relief or projecting, such as exists normally on the lateral walls of the epipharynx. The supratonsillar fold shows a small orifice, in which I introduced a probe, which projected under the epipharyngeal mucosa. The voice is nasal and gives place to the affection known under the name as *rhinolalie fermee.* We have here an annular stenosis of the isthmus of the pharynx, causing obliteration of the tube.

Treatment—Two results were sought for: 1. Dilation of the stenosis, and, 2, reestablishment of the permeability of the tube. The first of these desiderata was easy to obtain. I modified Hegar's bougies, giving them the form of an epipharyngeal applicator. I introduced a bougie, No. 16, which I left in place for one minute. Little by little I introduced larger calibres, which were retained longer and longer. I reached a calibre of 23 mm.

The disappearance of the nasal occlusion and the troubles produced by it was the first result obtained. Nasal respiration became possible, the secretion could be expelled by blowing the nose, the voice acquired more resonance.

But in the matter of hearing, while the patient had a slight augmentation of auditive acuity, the improvement was only transient.

In order to obtain the best results I tried to reopen the pharyngeal orifice of the tube. Through the superior portion of the tonsil I introduced a probe which I made project under the margin of the pharyngeal fold and come out again in the epipharynx. But the opening which I made closed again after a short time, and the attempt was vain. I tried electrolysis, but the electrolyzed site at the scar was closed again, and I did not discover anything which could clear out the vestibule or orifice of the tube. I asked my patient to consult Dr. Lubet-Barbon, who advised against the attempt. According to him all efforts to reopen the tube would be fruitless. He advised perforation of the tympanic membrane as an unique remedy for the deafness. After much discussion she decided to submit to this treatment, which I undertook in September, 1901. Perforation of the tympanic membrane was made by means of a crystal chromic acid. Instantaneously the hearing improved in an astounding fashion.

Take note that during three years the perforation has not closed. A slight serous discharge passes through this opening. The patient uses lavages when it is too abundant. Hearing continues good.

Case II. M. W. aet. 44, presented himself to me on March 12, 1904, accompanied by my colleague, Dr. Bourdillon. He complained of deafness. Previous history was not marked by any special event. He is in good health and is the father of several well-nourished children. He stated that at the age of 18 years he had a diminution of the hearing of the right ear, causing complete deafness at the present time. On the left side some difficulty of hearing appeared about ten years ago. Since that time the state of the patient passed through various stages of aggravation and improvement. Galvanocautery applications to the throat have been applied as a remedy for his deafness. Each application he said improved his hearing! So he asked for them to such an extent that he had had not less than a hundred applications. In Port Said and in Australia physicians use large cauterizations which in the patient's instance were applied with little danger.

Examination.—Ears—From a functional standpoint there was a very marked bilateral deafness with tinnitus. The lesion could be located easily in the middle ear. The objective examination showed a very decided retraction of the drum and a very pronounced inclination of the handle of the hammer.

Nose—Hypertrophy of the turbinals.

Pharynx—The pharynx is red and covered with varicosed vessels. The palate has a normal appearance, but approximates closely the pharyngeal wall; mobility restricted; posterior rhinoscopy, though difficult, is possible. The isthmus of the epipharynx has the form of a transverse cleft limited anteriorly by the posterior border of the palate, posteriorly by the pharyngeal wall. Each of the sides of the falciform folds is very lax uniting the lateral borders of the palate with the laryngeal surface. These folds cover the openings of the tubes. When the palate was drawn aside by the Moritz Schmidt retractor this membrane appeared to cover both sides of the pharynx, so as to blend with the superior border of the palate and to mask completely the opening of the tube. It appeared to be an annular stenosis, with obliteration of the tube.

Treatment.—To facilitate respiration I introduced respirators to overcome the constriction and the contraction of the ring. But in view of the lesson of the preceding case, I made no effort to reopen the orifice of the tube. Hearing, although diminished, permitted conversation. Intervention as to the tympanic membrane did not appear to me justifiable.

Pathology.—If by reason of these two cases it is desired to study the characteristics of the disease, we must inquire into the clinical picture.

Symptomatology.—The principal lesion is a new formation of a fibro-mucous membrane attached to the lateral walls of the pharynx covering the tubal orifices and vestibules and the fossae of Rosenmüller and in general all the projections and depressions which are normally found upon the walls. This membrane blends above and behind with the pharynx and below and in front with the superior surface of the palate. The adhesion has the effect of exercising a certain traction upon the palate which is attached to the pharyngeal wall and forms a stenosis of the epipharyngeal isthmus. This stenosis has the appearance of a fibro-membranous ring with a smooth surface, which may present a greater or less degree of stricture, The existence of this membrane constitutes the entire lesion.

It shows the following: When the palate is in a state of repose, the epipharyngeal isthmus is found much narrowed.

It is limited laterally by this bilateral membrane. The palate is fixed on the sides, but is free in the median portion. The uvula is attached to the pharynx and lies higher than in the normal state.

The posterior pillars may disappear; the free border of the palate may be united laterally with the pharynx. The uvula is not altered in its form and the examination of the mesopharynx may hardly indicate the existence of this anomaly, which might be misunderstood if the mucosa appears red and not cicatrized.

The adhesion of the palate and pharynx is lateral; it does not exist at the center and the uvula remains free, though limited in its movements. All these pathologic modifications cause a certain number of functional troubles which depend upon. (1.) respiration, (2.) olfaction, (3.) audition, (4.) phonation.

1. *Respiration.*—The symptoms resulting from the interference with nasal respiration are very extensive. Inspiration and expiration are both possible, but they are difficult in proportion to the closeness of the epipharyngeal stenosis. Inspiration is freer than expiration. The current of inspired air is remote from the palate, while the expired air is applied more intimately against the pharyngeal walls. The palate therefore acts as a valve, opening at inspiration and closing at expiration. A consequence of this peculiarity is the impossibility of blowing the nose, by which there is a stagnation of the nasal secretions, which accumulate in the nasal cavities and prevent the expulsion of the current of expired air.

The usual symptoms of nasal obstruction are found in these patients.

2. Olfaction is altered when the current of expired air is suppressed.

3. Audition.—Deafness and tinnitus are subjective phenomena of the obstruction of the tube when of such a high degree. In point of objective signs, we observe an obliquity of the handle of the hammer and retraction of the drum. In one case the membrana seemed attached to the promontory.

4. Phonation is altered by defect in the resonance of the nasal cavities, giving us the condition known as *rhinolalie fermee.*

Etiology.—The condition has been found in a man 45 years of age and in a woman of 23. In neither instance was there any disease except of a nature not absolutely fixed, but which was to be considered as a common lesion. In the two cases the galvanocautery was the principal means of treatment for the throat trouble. There were no evidences of acquired or hereditary syphilis.

Pathogenesis.—Most of the adhesions are due to the resolution of ulcers by new formation of fibrous tissue following an ulceration process. Was it the same in these cases? There is nothing to prove it. The infection came on insidiously. without pain or noticeable symptoms. It progressed insidiously and at no time was it recognized as a sequel of the ulcerations which no one had seen. There were no indications which would lead us to recognize the causes which brought about the substitution of the pathologic form for the normal. The absence of anatomico-pathologic knowledge upon the subject makes the explanation more hypothetical.

The affection cannot be considered congenital, since the subjective troubles of olfaction and respiration occurred in adult life. Perhaps there was an anatomic disposition which favored the production of this state. The action of the galvano-cautery is not demonstrated, but I have held it as a cause from the fact that there was an immoderate application in both cases.

So far as syphilis being a cause is concerned, there is nothing which shows its presence. The manner of annular stenosis differs altogether from the cicatrical bands consecutive to syphilis, as is shown in the parallel columns:

Annular Stenosis.	Syphilitic Stenosis.
Normal aspect of the pharynx, preservation of the form of the uvula.	Deformity of the pharynx, modification of the length and form of uvula.
No loss of substance; no cicatrices.	Loss of substance; cicatricial tissue.
Color of the mucosa normal; elasticity of the tissues; diffusion of the lesions.	Fibrous sclerosis of the connective tissue; color, yellowish-white; very rigid and extending without order.
Lesions cover the tube.	Persistence of the orifice and vestibule.
Regular, bilateral and symmetrical.	Localization capricious and irregular.
Free border of the palate free.	Adhesion of the free border of the palate, generally attached to the pharynx.
Stenosis annular with centripetal tendency.	Symphysis often going from the center to the periphery.
Course slow.	Rapid establishment of lesions.

If syphilis is claimed as a cause, we must consider as present a diffuse syphiloma or gumma, ulcerating and then cicatrizing.

Treatment.—The re-establishment of the orifice of the tube is impossible. Every opening made will disappear. We can then only seek to reconstitute the normal condition by dilating the stenosis. The best treatment, in my opinion, is with Heger's bougies. The necessary form for introduction into the epipharyngeal cavity can be given to them. They act as regular screws which permit the progressive degree of dilation desired. They act in every direction and dilate the stenosis on all sides.

After a short time the patient can introduce it himself, even if he cannot remain under the care of a physician. In this efficient and durable manner, the functional troubles of respiration and their consequences are relieved.

The free permeability of the nose is obtained, permitting expulsion of the nasal secretions. The *rhinolalie fermee* is overcome and olfaction re-established. For audition, paracentesis of the tympanic membrane is the sole means of improvement. Ought it to be employd immdiatly? It is preferable to wait until deafness has reached a marked degree.

In the first case it was very efficacious, and what is more remarkable, the relief was permanent.

XLIV.

CONTRIBUTION TO THE STUDY OF THE BOUGIRAGE OF THE EUSTACHIAN TUBE; MODIFICATION OF THE CATHETER ALLOWING SIMULTANEOUSLY THE COMPRESSED AIR DOUCHE AND THE PAINLESS INTRODUCTION OF THE BOUGIE.

Dr. C. J. Koenig, of Paris.

The bougirage of the Eustachian tube has become an important factor in otological technique. Numerous are the cases of deafness and of tinnitus caused by swelling of the walls of the tube or by fibrous stricture more or less thick and wide. Such cases are generally cured or are much improved by progressive dilatation by means of graduated bougies, for the catheterism alone or the air-douche according to the Politzer method does not always suffice to obtain regression of a mucous membrane in which infiltration has progressed to fibrous organization. The bougirage is in those cases a means of diagnosis as well as of treatment, but if care be not taken it may lead to errors. We must not forget that occasionally the introduction is hindered by a congenital bend of the canal or by folds of the mucous membrane; the tip of the bougie strikes against the obstacle and the bougirage is rendered very difficult, if not impossible. One may then think he has to deal with a stricture, when such is not the case.

The bougirage of the Eustachian tube is subject to other inconveniences; in the first place it is painful. I have observed that the rubbing of the bougie against the mucous membrane is the cause of the pain, rather than the pressure; for, when the bougie has passed the isthmus and is at rest, the pain produced by its introduction ceases rapidly, to return only when the bougie is drawn out or pushed forward and backward. The pain is felt either in the ear, the teeth or in the occipital region, and all patients complain considerably about it, though it disappears rapidly when the bougie is at rest or has been withdrawn. Furthermore, it often happens that the rubbing irritates the membrane, causes it to swell and thus diminishes still more the permeability of the tube, increasing the deafness and the buzzing; the middle ear may even become the seat of an inflammatory reaction.

Tearing of the mucous membrane and the resulting emphysema is another one of the drawbacks of the bougirage, but this slight accident, which has no serious sequels, will hardly happen when care is taken not to introduce the bougie too rapidly and too violently.

In order to obviate, as much as possible, all those inconveniences, I modified the catheter so that, by means of the compressed air, I could, during the passage of the latter, introduce the bougie at the same time. The air dilates the tube, flattens out the folds of the mucous membrane and the bougie passes with the minimum of rubbing and consequently with the minimum of pain.

The modification of the catheter consists in the replacing of the ring by a small canal which opens into the lumen of the catheter. This canal is for the passage of the bougie and as its orientation is the same as that of the ring, it indicates the direction of the tip of the catheter. The diameter is slightly superior to that of the largest celluloid bougie, i. e., a little more than a millimeter and a quarter. It is naturally necessary that the diameter of the lumen of the catheter itself should be superior to that of the bougie in order to allow the air to pass around the latter. The small amount of air which finds its way back through the small lateral canal is insignificant and does not diminish the pressure sufficiently to prevent the penetration of air into the tube and the middle ear. The Popp Company in Paris furnishes compressed air under a pressure of 5 kilogrammes per square centimeter and the pressure can be regulated at will by means of a cut-off. While the patient or an assistant works the cut-off the operator has his two hands free, the left one to hold the catheter firmly in place and the right one to introduce the bougie. The introduction is accomplished easily and without pain in the majority of cases and is greatly facilitated when prouounced fibrous stricture is present. The catheters are made *right* and *left* so that the bougies may always be introduced with the right hand.

XLV.

LUCAE'S SPRING-SOUND, PARAFFINED.

By Dr. C. J. Koenig, Paris.

I desire to recall the advantages of Lucae's sound, *paraffined,* for the direct massage of ossicles of the ear. By dipping the small cup of the instrument into melted paraffine, a small soft pearl of the latter substance remains adherent to it. The processus brevis of the hammer, to which it is applied for the massage, sinks into the mass—rubbing against the drum and slipping off the processus brevis are thus avoided as well as the pain and lesions which are the consequences thereof.

The cases which, according to my experience, are most benefittd by this method are those of ankylosis of the ossicles resulting from thickening of the mucous membrane of the tympanic cavity in people of a certain age (50 to 60 years old) without heredity, suffering from spurs or deviation of the septum and consecutive hypertrophic rhinitis with congestion of the drum. When the nasal cavities have been put into good condition, a few sittings of catheterism and of pneumatic massage improve those cases markedly—the congestion of the drum diminishes considerably or completely disappears, the whispered voice is heard at a distance of a few meters instead of a half a meter. I have frequently observed that those cases can still further be improved by direct massage with Lucae's sound after the catheterism and the pneumatic massage have been pushed to their extreme limit and have accomplished all they could. Especially the hearing of sibilant sounds, which seem to be less penetrating, and are heard by many people with difficulty, is much improved. It is, of course, necessary to do away with the congestion of the drum before resorting to the paraffined sound, which must in all cases be prudently used. At first the pressure must be very weak, 60 grammes, for instance, and the massage movements few in number. Also the sittings should at first be separated by a week's interval until the drum and the ossicles have become used to the contact of the instrument; they can then take place more frequently, increasing gradually at the same time the force of the pressure and the number of massage movements.

XLVI.

MODIFICATION OF THE EUSTACHIAN CATHETER SO AS TO FACILITATE THE RETURN OF EFFUSIONS IN THE MIDDLE EAR.

By Dr. C. J. Koenig, Paris.

In sub-acute and chronic catarrh of the middle ear with serous or mucous effusion, the disappearance of the latter is generally accomplished by catheterism. The exudations are in part absorbed by the lymphatic vessels, but are also in part blown back into the Eustachian tube and the naso-pharynx by the return of the air. One can be convinced of this fact in those cases where the exudation is mucous by examining the tip of the catheter after its withdrawal or by inspecting the opening of the tube with the post-rhinoscopic mirror—they will be found covered with mucus. But as the tip of the catheter obstructs the Eustachian tube, the exudations find an obstacle to their return and are blown back into the middle ear; thus the cure is retarded. Only with difficulty does a small quantity of the exudate find its way around the tip into the nasal pharynx. This inconvenience can be obviated by means of a grooved catheter, the groove being made on its convex side and running to its very tip. This disposition facilitates the return current and the exudates are blown back into the naso-pharynx. The more serous the exudate, the more easily will its return be accomplished. The caliber of the catheter must be as big as possible; under No. 4 the groove cannot be made large enough to produce a useful effect.

XLVII.

A CASE OF PURULENT PIAL MENINGITIS FOLLOWING AN ATTACK OF ACUTE MIDDLE EAR DISEASE. DEATH. AUTOPSY.*

By. J. H. Claiborne, M. D.,

NEW YORK.

I was called on Tuesday morning, February 16th, to see A. Mc. C. on account of pain in his right ear. I was unable to go but ordered hot douches every half hour, which the patient, being unruly, did not permit. A physician, a friend of the patient, called at my office a short time afterward and said the drum-head had burst the night before, but the pain had not ceased. From this fact I assumed that there was mastoid infection. I arrived at his apartments between 5 and 6 and found him in bed partly dressed, in which condition he had retired the night before on account of the cold. He was a man of about 40-45, slender and sallow in complexion and very tall. When I arrived he was conscious but in great pain; he did not complain of his ear at all but kept complaining of pain over his forehead which he continually pressed with his left hand and frequently tugged at his forelock, tossing his head from side to side. I discovered a piece of cotton in his right ear which was soaked with pus tinged with blood and the canal was partly filled with pus which apparently was odorless.

After syringing the ear and cleansing it, I discovered a free opening downward and outward through which pus was oozing. There was a slight redness along the anterior wall of the canal, but I was not able to discover any sagging of the auditory canal in the vicinity of the drum-head.

The mastoid was hard and firm and the skin over it normal; ordinary pressure produced no sensation whatever, but very hard pressure over the region of the antrum caused a slight wincing. I could not interpret this fact as indicative of mastoid involvement on account of the otherwise perfectly normal character of the region and the over-sensitive condition of the patient.

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*Read by title at the Thirty-seventh Annual Meeting of the American Otological Society, held at Atlantic City, N. J., July 11th and 12th, 1904.

The left ear drum-head was normal. His wife stated that the patient had suffered for about a month with constant headache and some dizziness which he attributed to the need of a change in his glasses. He had a bad cold for a week or more and on Monday, the evening before I saw him, he came home complaining of his right ear and his head. During the evening the pain in the ear got worse, also the headache. He became profoundly depressed and told his wife that "this would finish him." He did not send for me or anyone else but she gave him ¼ grain of morphin at his suggestion. During the night the ear-drum burst and the ear symptoms were relieved, but the pain in the head became worse. He suffered the entire night, at times practically out of his head, and on through the day, the pain apparently increasing up to the time I first saw him on Monday, about 24 hours after the commencement. His pulse was exceedingly hard, bounding, strong and irregular, and the beat about 100 per minute. His temperature, taken in the mouth with lips imperfectly closed, was 100-2/5°F. He was cold, though covered with heavy coverings and partly dressed, and very nervous, apprehensive, irritable and restless. His pupils were rather small but reacted normally. I did not have an ophthalmoscope and hence was unable to examine his fundi.

I had known this gentleman for a number of years and knew that he had formerly been an associate in a sanitarium for insane and drug habitues. On one occasion, several years ago, after he had left the sanitarium and was a traveling agent for a medical firm, he called on me. I observed at the time that he was "flighty," extravagant and exaggerated in speech and manner. He said he had left his former business because he was afraid his mind would become affected. I considered him a morphin habitue or a subject of commencing general paresis. This was at least 4 years ago. Since that time he had been able to attend to his business and make a good livelihood. His wife for a long time had considered him erratic. I have subsequently learned he had had, before his business call on me, a great mental trouble which constantly preyed on his mind.

I suggested that his urine be examined at once for sugar and albumin. Neither was present. I examined his lungs as well as possible under the circumstances and found nothing abnormal. I felt constrained to admit that I could not find any satisfactory explanation for his condition.

In view of the quickness of the rupture of the drum-head, the perfect drainage, the relief, or apparent relief from ear pain, as well as the normal character of the mastoid region, I excluded meningitis following ear disease as the cause of his symptoms. On account of his neurotic history and the suspicion of morphin, which I felt could reasonably be entertained, I concluded provisionally that it was a case of profound intoxication from grip with all the symptoms exaggerated by the nervous character and probable habits of the man. I turned the medical conduct of the case over to Dr. Valentine Wildman, with the request that he inform me of this condition in the morning. On the following morning Dr. Wildman telephoned that the patient had been ill all night and was then in a condition of vigil coma and that his right arm and hand were flexed and his fingers hooked and athetotic.

I saw him at 2:30 p. m. in consultation with Dr. Wildman. He was then insensible in coma vigil but somewhat restless. His right arm was flexed and his hand also. His fingers were contracted like a claw, the forefinger most of all, and his eyes were turned to the left in conjugate deviation, the left outward in the horizontal plane, the right one upward and inward. The pupils were small and reacted normally to direct light, slightly consensually. The optic discs were normal. He constantly made defensive movements with left hand and arm. His chin was turned to the right and upward but there was no rigidity of the neck worthy of mention. We examined his shins to discover, if possible, some stigmata of syphilis, but they were normal.

On consultation we concluded that the patient had meningitis of the frontal region and the left central convolution in the region of the arm, fingers and wrist centre and that there was an irritation there probably due to pressure; that the cause was either a tumor, an abcess or a localized exudate.

I could not bring myself to open the mastoid since there were no evidences of retained pus in that region and since the flow through the auditory canal was free and unimpeded; if the meningitis were due to an infection from the ear, the damage had already been done and an operation would be of no avail.

We considered the patient too near a lethal ending to inject bichlorid hypodermatically or K I per rectum. In short, we regarded the case as hopeless and promoted euthanasia.

Dr. Wildman was in attendance during Wednesday night. The patient developed Cheyne-Stokes' respiration in the course of the night and died at 3 a. m. Tuesday.

Between 5 and 6 o'clock of the same day the cranium was opened by Dr. O'Hanlon in the presence of Dr. Wildman, Dr. Morgan and myself. The dura appeared normal but as soon as it was torn away, the pia was seen to be reeking with thin yellowish pus over the region of the right mastoid; there was a pial purulent meningitis, which further examination showed extended over the entire cortex and to some extent at the base of the brain; the pus, however, was most abundant on the right side. There had obviously been an infection from the ear. As soon as the entire brain was removed, careful investigation revealed a petechial redness on the upper surface of the petrous portion of the temporal bone, just where the vertical wall of the squamous portion rises from the former, in fact, over the tegmen antri. When the pia and dura had been torn away it was found that there was an aperture there large enough to allow the entrance of a hairpin. A hairpin, pushed through the opening, went readily down in the direction of the antrum and mastoid cells. The petrous portion of the bone was then removed by chisel, but unfortunately, in removing it, the small aperture was included in the cut, and though the specimen was preserved, the point of entrance of the pus into the cranial cavity was obliterated. The antrum and also the mastoid cells were found filled with yellow pus. There was apparently no breaking down of the walls of the antrum or the cells. Our attention was then directed toward the left side of the brain; minute examination of the cortex showed no sign whatsoever of any other condition than that which the purulent meningitis had caused. The interior was then examined by careful slicing but no sign of tumor, abscess or exudate appeared at any place. All the ventricles and the cerebellum were included in the examination. It was the opinion of all of us that the brain substance was extraordinarily flabby and soft. There was one interesting phenomenon in this brain outside the meningitis and that was the existence of symmetrical pial hemorrhages on the anterior aspect of the middle lobes of the cerebrum. They were practically identical in location, extent and character. They might be described as petechial. An ill-defined history of a fall, 2 or 3 weeks before, may have some bearing upon this fact—otherwise it is inexplicable.

Cases of o. m. p. c. in which infection has taken place through a diploic opening in the bone have been reported, but it appears to me that the rapidity with which infection took place and death ensued in this case renders it unique.

At first I was disposed to condemn myself for not opening the mastoid the night of my first visit, but on second thought I feel convinced that infection had already taken place and the meningitis was under way at that time; that an operation would have been of no avail even if the cause of the meningitis had been recognized.

The conjugate deviation to the left was difficult for me to explain. It has been claimed that there are communicating fibres between the centres of the external and internal recti muscles on the floor of the 4th ventricle, so that the centre for the right external rectus, for example, supplies not only its own muscle, but the internal rectus of the opposite side in associate movement. It is only on this assumption that conjugate paralysis can be explained. In this case, however, no paralysis existed, for Dr. Wildman made the observation later that the eyes occasionally turned in the other direction, so that the deviation may be said to have been an irritation deviation and not a paralytic one. The original position of the eyes to the left, however, is consistent with the location of the irritating lesion on the right side. I have no apology to make for having been deceived by the hand and arm symptoms; my conclusions were consistent with localization theories if not localization facts.

The only way conceivable in my mind, in which the lethal termination of this case could have been prevented was to have performed paracentesis a few hours after or just at the beginning of the middle ear inflammation, and yet, even this idea is open to objections.

Dr. O'Hanlon suggested that the entrance of atmospheric air through the rupture forced the pus upward into the antrum, the cells and through the diploic opening into the cranial cavity. A paracentesis might have produced the same effect if this explanation is the true one.

The sum of it all is that this patient would not have been infected by his ear if the diploic opening had not been present. It is a significant fact that the pain in his forehead and head became violent very soon after the rupture of the drum-head.

The unfortunate and rapid termination of this case accentuates the seriousness and gravity of acute inflammation of the middle ear and in my opinion the necessity of an early puncture when pain is severe and signs of distention are present. The possibility of the existence of diploic openings into the cranial cavity should always be borne in mind in cases of acute o. m. p. and we should not allow a long-continued immunity from disaster to beget over-confidence or lead us to minimize the dangers in this affection.

While I feel that the conduct of the case was consistent with reason in so far as operative interference was concerned, yet I feel that I erred in going far afield to find an explanatory cause for the condition when a nearer one was at hand, thereby losing the intellectual satisfaction of a correct diagnosis.

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XLVIII.

A CONSIDERATION OF AND THE INDICATION FOR THE REMOVAL OF THE MIDDLE TURBINAL.

By B. R. Kennon, M. D.

NORFOLK, VIRGINIA.

In the large amount of literature which is constantly appearing on diseases of the nose and naso-pharynx, I have been surprised at the meagre amount of work which seems to have been devoted to the middle turbinal, considering the importance of its position and the direct and indirect evil consequences of its hypertrophy. Most of the text books give it but cursory mention under the general heading of hypertrophic rhinitis. The subject of this paper may be most conveniently considered under the following heads: Nasal obstructions, naso-pharyngeal affections, middle ear conditions, accessory sinus inflammations, and various reflex and nervous phenomena, viz: hay-fever, asthma, nasal headache, etc. Taking these up seriatim:

Under the first heading, when we consider the position of the middle turbinal situated in the direct pathway of the air through the nasal chambers, it can readily be seen how marked hypertrophies of this body will cause evil consequences upon respiration. The results obtained by the removal of said hypertrophies has given more certain and satisfactory results than when the septum alone has been attacked. It is usually found that the hypertrophy is a true increase in the bony structures and not an increase of the soft tissue, except in a small percentage of cases, and then only at its anterior and posterior extremities constituting the mucoid and lymphoid hypertrophy of Lennox Browne and the polypoid degeneration of other authors. This can readily be demonstrated by the firm consistence of the body of the bone, as shown by its resistance to the probe and the small amount of shrinking obtained upon the application of cocain and other astringents.

Do not understand me to underestimate the importance of deformities of the nasal septum, for the latter should in all cases be made to conform as nearly as possible to the normal, since hypertrophic rhinitis most frequently has its beginning in the irritation and abnormal air pressure due to these irregularities, producing secondary hypertrophy of the middle turbinal. There are many cases of irregular deformities where all of our efforts for their relief will leave much to be desired, and it is especially in such cases that the removal of the middle turbinal will give the satisfactory result that can be obtained by no other means.

It has been stated that when the irregularities of the septum have been corrected and the consequent source of irritation thus removed, there will be a spontaneous shrinking of the turbinal body. This may be true in a very limited number of cases, if seen sufficiently early, but when we consider that there is an increase in the bony elements and a mucoid or lymphoid degeneration, it will be seen how impossible it is for this spontaneous shrinkage to take place.

Furthermore it is often impossible to remove the pressure with resulting irritation between the middle turbinal and septum except by the removal of a portion of this structure. This is especially true in cases of general thickening of the septum.

While considering the subject of the relief of nasal obstruction I have been particularly impressed with the undue importance which has been attached to the inferior turbinal by the unsatisfactory results obtained by its partial removal, as observed when there is a free passage in the inferior meatus, the patient still complaining of an obstructive and stuffy feeling in the nose.

This is readily explained by the fact that this is not the normal respiratory pathway, as may be readily demonstrated by having the patient inhale magnesium or any light powder, after which an inspection of the nose will show very little deposit in the inferior meatus.

Furthermore, the enlargement of the inferior turbinal is not due to a bony or mucoid hypertrophy, but is usually simply a congestion of its cavernous sinuses, and are effected by a hypertrophy of the middle turbinal in that the congestion of the latter will settle into the inferior when the patient is standing just as the lower side of the nose is effected when the patient is lying down, by the blood gravitating to the more dependent side.

The relief of this hyperemic condition of the inferior turbinal is usually rapid and complete after the removal of the middle.

The hypertrophy of the middle turbinal has a most important bearing in the causation of naso-pharyngeal and laryngeal catarrhal affections. Among the important causes of naso-pharyngitis is the dropping of secretions from the nose into the naso-pharynx, which acts in a two-fold manner, viz., by the irritation caused by the presence of the secretion and the injury done the mucous membrane by the constant hawking to dislodge it.

The insufficient evaporation in the nose in hypertrophy of the middle turbinal causes the air to reach the naso-pharynx insufficiently moistened, with the result that there is an evaporation of the watery elements of the secretion of the part, leaving the already increased mucous elements tenaciously sticking to the vault and posterior wall of the pharynx and acting as a foreign body thus increasing the inflammatory condition.

The effects on the larynx are much the same as those acting on the pharynx with the additional factors of mouth breathing and the direct extension of the inflammation from the pharynx to the larynx.

The baneful effects of hypertrophy of the middle turbinal and the beneficial effects obtained by its removal in catarrhal affections of the middle ear and Eustachian tubes are to my mind the most important, for here we are dealing with a condition that often baffles all efforts made for its relief and if not relieved or arrested, practically ostracises the unfortunate sufferer from the society of his fellows and in almost all occupations deprives him of the ability to earn a livelihood.

When we consider the position of the hypertrophied middle turbinal, with its posterior extremity, just above the tubal orifice, it is not strange that we should expect improvement in the ear and tubal conditions under consideration, from its removal.

The improvement in the hearing and the relief of subjective noises from the removal of the hypertrophied middle turbinal has been, in my experience, more certain and marked, than in those cases where the obstruction has been due to irregularities in the nasal septum. The deleterious effects on the ear and tube are brought about in several ways, viz., by impeding the return circulation from the tubes and middle ear, by preventing a proper aeration of the middle ear due to impaired nasal respiration, and secondarily through the pharynx, where we have a direct extension of the inflammation to the tube and middle ear, also the frequent stoppage of the pharyngeal end of the tube by the tenacious mucus in the pharynx.

There is a unanimity of opinion as to the advisability of the excision of the anterior end of the middle turbinal in purulent inflammation of the frontal, anterior ethmoidal and maxillary sinuses and of the whole bone where the posterior ethmoidal cells and sphenoidal sinus are involved, for it obstructs the view and drainage of their natural openings, making it essential to clear these outlets before other treatment is instituted. But in my opinion, the hypertrophy of the body sets up a catarrhal inflammation in these cavities by obstructing their ostea, preventing proper aeration and drainage and thus causing a decomposition of the catarrhal secretion, resulting finally in the purulent variety.

Probably more than four-fifths of all mucous polypi arise from the middle turbinal and bulla ethmoidalis. When found attached to the former it may be found more satisfactory to remove the bone, for the double reason that recurrences are much less frequent after this procedure and these polypi frequently arise between the middle turbinal, and the body of the ethmoid and it is only after the removal of the turbinal body that polypi in this situation can be satisfactorily seen and removed.

While I do not wish to make the claim that the removal of the middle turbinal is a panacea for hay fever and asthma, the results after its removal have been in my hands, better than from any other procedure.

Without going into the various theories of hay fever, I will say that I have never seen a case of this affection in which there was not turbinal pressure.

While the above condition is not so constant in asthma, the cases in which there is turbinal pressure hold out the most flattering hopes for the relief or alleviation of this disease by surgical means.

In my experience the cases of so called nasal (pressure) headaches have not been so frequent nor the results from the removal of the middle turbinal so flattering as some reports would seem to indicate.

I would remind those who have used cocain to cause shrinking of the turbinal and thus relief of these headaches, that it is the constitutional and not the local effect of the cocaine, which has brought about this result.

I would add in conclusion that in the large number of cases in which I have removed the middle turbinal, I have not in a single case had any complaint of undue dryness of the pharynx of other disagreeable symptoms and think that we have in this operation one of the most valuable surgical procedures in the nose.

The method of removal. The difficulty of satisfactory removal probably accounts for the comparative small amount of surgical work which has been done on this body. In my hands nothing has been so satisfactory as the cold wire snare, but I will add that it was only after the most persistent and long continued efforts and after many failures that the necessary dexterity in its use was acquired.

I use a Sajous' snare as modified for me by Meyrowitz, by increasing the size of the thumb screw to one and a half inches in diameter and having two holes in its end to facilitate threading.

To gain a better view of the field of operation and more room for manipulation in the nose, I paint the inferior turbinal and septum, but not in the middle, as will be seen hereafter, with adrenalin solution 1-4000. It will be found that the principal difficulty is to prevent the loop from slipping off after the bone has been engaged. To obviate this as much as possible, I now use holocain solution 1%, which does not cause the contraction of the mucous membrane and other soft tissues of this body, as does cocain. This solution has produced as satisfactory anesthesia as has cocain in 4% solutions.

At times it will be found that it is impossble to engage the bone with the snare and then it will become necessary to resort to some turbinal forceps or scissors. Those of Lester have been quite satisfactory in my hands.

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XLIX.

THE CONSTANCY AND VARIATIONS OF THE SUPRAMEATAL SPINE OF HENLE.*

By Macleod Yearsley, F. R. C. S.

SURGEON TO THE ROYAL EAR HOSPITAL.

Until quite recently, in common with most otologists. I believe, I considered that we possessed a guide to the mastoid antrum which was, to all intents and purposes, infallible. In opening that cavity I have always taken the suprameatal spine of Henle, when present, as my landmark and I have never failed to reach my destination. In the monograph[1] which I had the honor to translate, Broca remarks: "L'Epine de Henle, losqu'elle existe, est un repere operatoire precieux." Dench, in his communication on "The Operative Treatment of Mastoid Inflammation,"[2] says: "The bone should first be removed as close to the posterior wall of the bony meatus as possible, and not above the level of the *spina suprameatum.*" Orne Green[3] also gives the spine as the upper limit for the removal of bone and all other works which I have consulted give this landmark or, if they do not mention it, give measurements which tally wlth its position. This position, moreover, agrees with Macewen's triangle.

At a recent meeting of the Otological Society of the United Kingdom,[4] however, my colleague, Mr. Arthur Cheatle, showed 18 adult temporal bones of various ages, showing some fallacies of Macewen's triangle as a guide to the antrum.

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*Author's Abstract of paper read before the 7th International Congress of Otology at Bordeaux, August, 1904.

[1] Anatomie Chirurgicale et Médécine Opératoire de l'oreille moyenne, par A. Broca, Paris, Masson et Cie, 1901.

[2] Transaction of the VI International Ototogical Congress, 1899, p. 150.

[3] Text Book of Diseases of the Eye, Ear, Nose and Throat, De Schweinitz and Randall, Vol. II, p. 794.

[4] Journal of Laryngology, Vol. XIX., No. 5, p. 271.

These, with a number of others prepared by him, Mr. Cheatle kindly placed at my disposal for examination. In many of these sections the antrum lies entirely above the spine, whilst, in a few of them that landmark, if followed too closely, would lead one directly into the middle cranial fossa.

Now, although Mr. Cheatle's sections increase our knowledge of the vast variability of the relations of the mastoid antrum and consequently emphasize the importance of care in opening it, I don't think that they necessarily invalidate the claims of Henle's spine as a valuable landmark when present. I recently performed a radical post-aural operation in which the antrum proved to be altogether above the level of the spine, yet, using the spine as my guide, I reached my objective without difficulty. Although Mr. Cheatle's work warns us to be careful, one need not therefore abandon this guide in operating, and I believe it to be, when present, the most reliable that we possess.

In this belief, one is naturally anxious to ascertain the constancy with which the spine of Henle is present, and I was not satisfied with the information already in our possession upon this point. In the monograph referred to, Broca states that Kisselbach found it present 82 times out of 100, Schultz 109 times in 120, whilst Lenoir only found it absent once in 100 skulls, that is to say once in 200 ears. The sum of these observations makes the spine absent 30 times in 420 cases, or in 7.14 per cent. It will be noted that in the three investigations the percentage of absence ranges from 18 per cent. (Kisselbach) to 0.570 (Lenoir), which is somewhat wide. It appeared to me that no one had as yet examined a sufficiently large number of skulls to accurately gauge the frequency of the landmark. I therefore examined 1,017 skulls—representing 2,000 ears—in the museum of the Royal College of Surgeons of England, and the results are embodied in this paper.

Of the 1,017 skulls, 659 were males, 281 were females, and in 77 the sex was doubtful. The ages varied from 4 to 112 years, the four oldest being two Dutch males of 107 and 112 and two Dutch females of 106 and 110. The nationalities included the principal races of mankind.

As some of these skulls were wanting in one temporal region —I purposely did not make my examination selective—the ears they represent are exactly 2,000. The spine of Henle was absent 160 times, or 8 per cent. On the right side it was absent 39, on the left 53, and on both sides of the same skull

34 times. In addition, however, it was extremely badly marked in 257 examples, or 12.57 per cent. In these latter cases the spine was just recognizable to the trained eye and finger, and I exercised considerable care in distinguishing between instances in which it was just indicated and those in which there was complete absence. The number of cases in which complete absence on one side was accompanied by a very badly marked spine on the opposite side was 47. In all other skulls in which the spine was absent on one side it was well-marked upon the other. Therefore skulls with the spine slightly preponderated over those in which absence on one as 47 is to 45. As regards sex, absence of the spine was slightly more frequent in females than in males (as 61 to 53).

If the supra-meatal spine is absent to the extent of 8 per cent. (a figure which corresponds with the combined results of Kisselbach, Schultz and Lenoir), we cannot place complete reliance upon it as an operation landmark. In cases of absence, unless measurements are taken, to what are we to turn for guidance? My reply is that there is a much more constant guide than the spine. In a fairly typical temporal bone there is to be seen, just behind the supra-meatal spine, a slight excavation, varying in shape, size and depth, but always pierced by a varying number of foramina. This is the *supra-meatal fossa*, and that I have found to be present in every one of the 2,000 ears examined. Its aspect varies greatly. It may be a large and excavated triangular depression, cribiform and pierced; it may be a slight circular of oval hollow sparsely pierced by foramina; it may be a mere slit behind the supra-meatal spine; or it may be represented by one large or two or three small foramina. But not in a single specimen was it such that it could not have been readily recognized during operation. Indeed, when the bone is freshly denuded of its periosteum these foramina show up on the white surface as small red points.

It is, therefore, obvious that the supra-meatal fossa is superior to the spine of Henle as a guide in opening the mastoid antrum.

The reason for this greater constancy of the fossa over the spine lies in its origin.

The spine of Henle is, as pointed out by Broca[5] from the work of Lenoir and Millet, wholly unconnected with the tympanic ring, but rather to be considered as developed from the osseous point known in embryology as the *epitympanal* of Geoffray Saint Helaire. In old horses, at the spot where the spine of Henle is found in man, a special bony point can generally be seen, distinctly separated from the tympanic ring and not in the least united with it. This observation I have confirmed by the examination of several skulls of the *Equidae*. I have also examined the skulls of 5 gorillas (*Troglodytes gorilla*), 12 *chimpanzees* (*Anthropopithecus trytodytes*), 12 *orang outans* (*Simia Satyrus*), and one gibbon (*Hylobates sp. incerta*), and found both spine and fossa recognizable, the former quite distinct from the tympanic ring. I also examined the skulls of 80 monkeys and found that the spine was marked, distinct, or easily recognized in only 29. The fossa was, however, indicated in a greater number. It was a noticeable fact that the higher the monkey in the scale, the more constant is the landmark under consideration.

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[5] Opus cit., p. 3.

The spine of Henle cannot be relied upon below 4 years of age. Lenoir came to this conclusion from the examination of the mastoids of 30 children. In infants, however, there is a landmark which is very characteristic. I have already pointed out the frequency with which the supra-meatal fossa is quite cribiform from the number of vascular foramina and these foramina are often spread over a wider area than that occupied by the fossa. In the infants, these foramina transform this part into a sieve-like plate of bone, which is seen as a very marked, purplish lamina when operating upon or dissecting this region. Broca, who named this spot *tache spongieuse*, states that he has always seen it in the foetus of more than 8 months and in children under 2 years. It is first situated above the meatus, then above and in front; later it comes to coincide with the supra-meatal fossa. It is stiuated exactly over the antrum and changes its level as the antrum changes its position, as growth proceeds. The importance of this *tache spongieuse* lies in the fact that it transmits numerous small vessels into the interior of the bone. The supra-meatal fossa with its vascular foramina in varying number is the adult condition of the infantile *tache spongieuse* and this accounts for the fact that it is practically never absent, although it may be reduced to two or three small foramina or even a tiny slit.

The relative greater constancy of the supra-meatal fossa makes it a more reliable guide to the antrum than is the spine of Henle, and this value is enhanced by the fact that it is present, as Broca's *tache spongieuse,* from birth.

The variation in size and shape of the spine and of the fossa which the examination of a large number of skulls reveals is considerable. These variations are not, however, of any special importance. In conclusion, I wish to add a few words as to the relative frequency of the spine of Henle in different races. It appeared that in no particular race was absence more common. As a general rule, the more massive the skull and the more developed the ridges and surfaces for muscular attachment the more likely was one to find the spine present and well-marked. Among negro skulls, for instance, the spine could always be easily recognized, whereas among female skulls and in highly civilized races, instances of absence were more likely to be found.

L.

A SPECIAL SYNDROME OF ENDOCRANIAL OTITIC COMPLICATIONS (PARALYSIS OF THE MOTOR OCULI EXTERNUS OF OTITIC ORIGIN).*

By Professor G. Gradenigo.

In three successive communications[1] to the Royal Academy of Medicine at Turin, I took occasion to draw attention to a special morbid syndrome, characterized by the association of acute otitis media accompanied or not by external suppuration, with very intense pains, localized in the temporal and parietal region, and with a paralyisis or paresis of the external motor oculi nerve of the same side as the aural lesion. I have seen six cases of this disease, and as a result of my communications, my colleagues Mongardi (of Bologna) Ricci (of Treviso) and Citelli (of Catane), have kindly sent me the histories of three other cases. In reviewing the otologic literature, I have been able to collect twelve other cases of which four were reported at the last session (May, 1904), of the French Society of Otology and Laryngology (Lannois and Ferrand, Lubet-Barbon and Cheval,. The authors have given different interpretations to this particular association of symptoms.

The study of my cases, compared to that which has been published, permits me to draw the conclusion that, this syndrome of clinic symptoms is the result of a circumscribed purulent simple serous leptomeningitis, localized about the tip of the pyramid, and caused by the diffusion of the infection in the tympanum. The constancy of the clinical picture makes me believe that the propagation was along the pre-existing anatomic paths. Usually, the leptomeningitic focus tends to get well of itself, or following treatment of the drum (paracentesis) or of the mastoid, done to eliminate the aural infection; in certain cases the spread of the meningitis caused the death of the patient. From these facts the diagnostic importance of this syndrome is apparent, as is the necessity for considering its termination, in spite of its apparently benign character.

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*Read before the International Congress of Otology, Bordeaux, August, 1904.

(1) Jan. 29, Apr. 21, June 17, 1904.

LI.

ASSOCIATED OTOMYCOSES (A VESICULAR-PUSTULAR AFFECTION OF THE EXTERNAL AUDITORY MEATUS CAUSED BY ASSOCIATED MICROPHYTES AND PATHOGENIC BACTERIA. DIAGNOSIS AND TREATMENT.

By Dr. Louis Bar,

NICE.

There are numerous kinds of polymorphic affections of the external auditory meatus, phlyctenular or vesicopustular, which are caused by more or less well defined microorganisms, and which are more or less easily curable. In such cases there should be no difficulty in diagnosing them from furuncle, or the changes due to herpes, eczema or even syphilis, although striking resemblances to cases of this kind demand a precise diagnosis. In this disease, there is an otitis externa diffusa with very marked characteristics, an otitis which is mild and very painful in the different phases of the disease, more or less secretion and even hemorrhages, being somewhat analogous to the mycotic inflammations of the external auditory canal. In certain points they recall the disease which Politzer[1] called "Otitis parasitica," and to which Weiden[2] had assigned the aspergillus as a cause; disease whose origin Virchow tried to recall by the name otomycosis, while to observations by Mayer[3], Paccini[4], Carl Kramer[5], Schwartze[6], etc., were added the contributions of Burnett, Blake, Patterson, Cassels, Bezold, Lewemberg and others which were important in establishing their pathology. In a previous publication, devoted to otomycoses[7] I tried to add to the study of this disease, as much

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*Read before the International Congress of Otology, Bordeaux, 1904.

(1) Politzer—Text-book of Diseases of the Ear.

(2) Wieden—Monograph, 1888.

(3) Mayer—Arch. f. Anatomie (Muller's) 1866.

(4) Florence—1851.

(5) Viertaljahrschr. d. Nature (Zurich 1859-1860).

(6) Schwartze—Surgical Diseases of the Ear.

(7) General Studies and Experiments on Otomycosis (Moscow, 1897).

to its deliniation as its therapy, while in another work of the same kind[8], I called attention to the fact that otitis externa diffusa is caused not only by the aspergillus, but also by other microscopic fungi, such as the tricophyton. According to bacteriologic studies, the cases of otitis externa whose observations I will report later, do not appear to belong to the same class of otitis parasitica as those due to the aspergillus and tricophyton, because of this one difference, that instead of being simple. and caused by only one microphyte, they are complex and caused by associated organisms. In short to that generic element the microphyte, there is added the most diverse micrococci whose presence contributes to the virulence and stubbornness of the disease. For the parasites present having caused a stubborn inflammation, as will be seen below give way to frequently recurring inflammations of the external auditory canal and tympanum, whose nature is frequently unknown, and which is one of the most frequent of the non-traumatic external otitides in the adult. The microorganisms are especially the mucedins (aspergillus glaucus et niger, escophora elegans, trichothecium roseum, mucor mucedo, oidium albicans) which are unable to attack the auditory meatus of man at first, since no mucedin can live in the normal skin of the meatus, but without doubt, as Schwartze thought and as seems to be proven by my observations. its entrance into the integument is due to some abnormality, such as a detachment of the epidermis, and excoriation, or a superficial inflammation of the skin, where the micrococci are already present and rapidly increase. Here the different micrococci (streptococci, staphylococci, and even the coli bacilli) find suitable nutrition; they germinate and multiply rapidly, while their presence in and on the epidermis gives a complicating character to the previous inflammation, which latter might be called the preparing disease. There can then appear an otitis externa hemorrhagica, preceded by the parasitic inflammation, which soon dominates the scene; or a severe dry hyperemia followed by a very severe inflammation may give way to a caseous or pseudo-membranous exudate, which can be detached only with great difficulty, which is constantly renewed, and which each time that it is removed reveals the subjacent lining of the meatus and the red tympanum. The entire canal, even its superior part, deprived for a large part of its epidermal coat,

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(8) Tricophytes of the External Auditory Meatus (Congress at Paris, 1900).

shows in its place scales, masses more or less adhering to its epidermis, infiltrated, in places, with spores of the mucor, with or without micrococci. More recently I have observed that the blebs or phlyctenula filled with red blood, or purulent fluids are frequent in the diseased meatus. They seem to follow the erythema. They are rarely absorbed. They rupture, and when their contents are discharged, they dry up and are soon detached as scales. At the same time, also, vesicopustules follow hyperemic macules. If they remain simple vesicles, they break and dry up when they are in the interior or at the entrance of the meatus. If they become vesicopustules, they cause profound changes in the dermis. They are very painful. They become umbilicated or rupture to form an ulcer whose red base comprises the deeper layers of cells, the Malpighian, and whose borders are enclosed by a dry cornified zone, which adheres for a long time. In certain cases, however, they form numerous, true abscesses, which close the lumen of the meatus and which either by their appearance or their pain resemble the acute ulcerating tumors of tuberculosis, so that they should be the cause of frequent errors in our daily practice.

The polymorphism of this affection is an evident reason for its difficulty of diagnosis. Really, it can not be actually established except by a microscopic examination of the material directly removed *a loco dolente.* It should be examined as soon as possible, and again immediately after the results of the culture made direct from the meatus are known. These cultures made at the temperature of the room or a constant temperature of 38° at the Pasteur Institute on gelatine or better on Raulin's fluid, give, after 48 hours, the first signs of development of microorganisms, and this continues for some time, since we know tubes where the development has gone on without stopping for three months. Seen under the microscope (Leitz No. 4. obj. i. e. 960X). the mass removed from the diseased ear and the cultures present different appearances. Stained with Kuhn's fuchsin-phenique (carbol-fuchsine), the specimens show very clearly myocelium filiaments, some single, some branched, sometimes budding, sometimes in full bloom with their hyphes and gonoids. Certain specimens, however, show only spores which are free and very mobile(1). In most of the specimens, I noted the presence of different bacteria, such as the streptococcus pyogenes, staphylococcus, and diplococcus; micrococci in a diffuse mass and even the coli bacillus (a specimen of Beunat). In the diseases of the ear, the presence of the coli bacillus could justly cause surprise, if it were not for the well known tendency of the bacillus, indigenous to the large intestines, to wander, even into the meninges, where it finds a favorable soil and causes a meningitis purulenta. But whatever be the pathogenic bacterium, microorganisms belonging to the lowest order of vegetables, their presence by the side of cryptograms and algees in the course of an inflammatory disease, seems to me to give to the latter all the morphologic appearances of a mixed infection, being at the same time a disease clearly parasitic and clearly infectious. In the same way it seems to me that physiologically, the kind of otitis should have the characteristic of the one or the other, according to the dominating element in each case. Therefore, our patient sometimes has to endure very severe and painful symptoms, while others suffer only a nervousness due to a continued otorrhea. As a result, the symptomatology is variable, according to the species of the parasites, their pathologic action, their stenosing of the external auditory meatus, or their presence deep down, and the subjective state of the patient. Statistics give a relatively small percentage, 0.1, of otomycosis, which is at the same time the simplest and most studied of this class of affections. Bezold at Munich found the percentage 1.5, but no conclusion can be drawn from this because there was little true diagnosis, due to the fact that because of the lack of time, they rarely used the microscope, and because confusion with other otitides diffusae externae is very easy.

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(1) Investigations made at the Laboratory of Hygiene of the city of Nice, in collaboration with Dr. Beunat, of the laboratory, whose assistance has been very valuable to me.

Considering the ease with which these microorganisms are communicated, and their growth on culture media, we can declare that it is certain that this disease is contagious. Likewise there is no doubt that the spores of the parasites are carried into the meatus by non-aseptic instruments, badly kept syringes, instillations of contaminated solutions, and finally by instillations of oily substances which remain in the ear and furnish an acid soil, so favorable to the development of microphytes. I have already remarked that an otitis externa parasitica is hard to cure, that is, its prognosis. The persistence of the disease depends not only on the microphytes and schyzomycetes which cause it, but also on the association of these with pathogenic bacteria. The otomycosis is stubborn, nevertheless it is completely curable, if one has the patience to continue treatment, which, ought to be continued to complete cure, however complicated and associated with pathogenic bacteria it may be, or however involved in the usual complications which the different microrganisms cause. The otomycosis, as we have seen, can be completely cured, however complicated, but the work is doubled. It is necessary that neither patient nor doctor give up, for it is only after very long treatment, and earnest, diligent, various though uninterrupted efforts, only after having passed the aftermath of unexpected and inexplicable relapses, that we arrived at definite results. Except the possibility of tympanic perforation, as Bezold and Politzer fear, and except the hypertrophy of the integument of the meatus auditorius externus, to which the mild but tenacious inflammation disposes, we need dread only neurasthenia, which is induced by an affection that never gets well. Furthermore, many nervous sounds may result from it.

If the single otomycosis responds to the indications, which are precise enough though variable, and which results in a cure in one or two months, it is necessary to admit that in associated otomycoses, it is not the same. The most varied treatment remains often without effect, and this class of otitis resists most stubbornly the usual antiseptics. While we have employed in the simple cases, with much success, lavage of the meatus with solutions of calcium hypochlorite 0.1 to 200-300 of filtered water, recommended by Wreden; while absolute alcohol, tannin and alcohol 1% of Weber Liel, 2% salicylic acid of Bezold, 2% carbolic acid, and subacetate of lead V-X drops in a glass, of water have been recommended as sometimes useful, we are able to state that the associated forms of otitis externa parasitica have been, in our experience, always refractory not only the usual indication but also to solutions of sublimate and cyanide of mercury, of each 1-100: that they have been unaffected by applications of the tincture of iodine and nitrate of silver; that a saturated solution of boric acid in alcohol seemed for a while to give hope, but that it was necessary to give it up on account of the irritation and caustic action caused by it. The usual resources being so futile, we have studied microscopically the microphytes and bacteria for a new tentative therapy. This seemed to us should be founded on the variety and mode of life of the microbic elements found in the microscopic examinations we have made of our cases. Now, the biology of bacteria has informed us that the spores of the schyzomycetes and microphytes are, in general insensible to physical and chemical influences, that they are even refractory for a long time to temperatures around 212°, and that their vitality is extraordinary. Gruber, who was the first to study this question seriously arrived at this conclusion, that the only indispensable condition in the development of the oidium albicans is the constant presence of a medium impregnated with a sweet or amylaceous substance, which is fermentable, and consequently acidifiable. Now it is logical to conclude, by analogy with their congeners, that an acid medium is the one favorable to the development of the mucidines, and that the acid of the mucus in which the parasitic concretions are continually bathed, a phenomenon consecutive to parasitic development, contributes, when once produced, to the welfare of the cryptogenous vegetations. And it is also logical to conclude that every alkaline or alkalinifiable medium is or should be unsuitable to the vitality of cryptogams. As a result of these biologic considerations we have been led, in the treatment of those otitides whose fundamental cause is a fungus schyzomyces, to try the rational means which study as well as experience showed to Niemeyer and Gruber as the most efficacious in arresting the development of and the destruction caused by the oidium albicans, namely, the cure of thrush.

In the treatment of this class of cases, we should use alkalines. But since a large part of the virulence of this particular inflammation of the external auditory canal must be attributed to the pathogenic microbes that accompany the microphytes, we have added to the alkaline solution an energetic non-acidigenous antiseptic such as sublimate, which seems best for the purpose. Furthermore, considering the well known insensibility of the spores of the schyzomycetes to physical and chemical changes we have used medicated alkaline solutions in the form of profuse irrigations, in order to add to the chemical action of the alkali, the mechanical action of lavage with large quantities of fluid, the only method of removing from the meatus, the spores or gonoids, which are surgically inaccessible.

The method of treatment of associated otomycosis may be outlined as follows:

(1) Daily cleansing of the diseased meatus, so as to remove completely the integument that is not ulcerated, the

scales, the concretions and the caseous deposits that clog the meatus.

(2) Immediately following the cleansing, and several times a day, according to the importance of the case, a profuse lavage of the canal with a solution of distilled water containing to the litre 4.0 of sodium bicarbonate or borate, to which has been added 25 centigrams of sublimate.

(3) Insert in the meatus a wick of sterile gauze saturated with the alkaline solution, in order to keep the walls of the meatus apart, and to prevent as far as possible all auto-infections.

(4) As an internal treatment, alkalines or malt.

In certain ones of the cases we treated, the treatment was immediately followed by an encouraging result, although all treatment had been ineffective. From the very first alkalino-antiseptic application, the cryptogamous concretions were detached with an every increasing facility, the white foci disappeared to reappear more mildly and less intense, the redness and heat of the meatus diminished as the cure progressed. Nevertheless the cure was prolonged, and this rebelliousness proves how tenacious this affection is but in spite of everything we are able to say henceforth without fear of contradiction that whoever has to treat a case of associated cryptogamous otitis will not find, for the present at least, any treatment so rapid, so efficacious and at the same time so simple as that of an alkaline with sublimate, as has been given above.

To summarize:

Certain diffuse otitides externæ with phlyctenulæ or vesicopustules are only simple or associated dematomycoses with different pathogenic bacteria, which cause polymorphism and difference in intensity.

Although their evolution is characteristic of the different schyzomycetes (aspergillus glaucus et niger, oidium albicans, mucor mucedo, tricothecium roseum, tricophyton of Molstein, etc.), which cause them, by virtue of their association with different pathogenic bacteria (streptococci, staphylococci pyogenes, micrococci, etc.), they acquire certain influences which profoundly modify their symptoms, course and termination. These are e. g. frequent hemorrhagic phylctenulae at the beginning of the disease, vesicopustular forms, inflammatory stenosis of the external meatus, whitish deposits and pseudomembranes.

Resistent to all simple treatments, these parasitic otitides become more and more severe, intractable, and recurrent because of the microbic complication. They always yield to treatment after a longer or shorter time.

In carrying out the treatment, we remember a fermentable and acidigenous medium is the condition favorable to the development of microphytes, and it is necessary to make the medium alkaline and antiseptic. Rationally, and by analogy, the treatment of thrush would be the best applicable to the ear. Profuse lavage with an alkaline sublimated solution, i. e., an antiseptic, non-acidigenous, alkaline solution, is indicated.

Case I. M. T., Moscow, act 56, without special history, was sent to us by our worthy confere Dr. Ollnitz, for abscesses of the left auditory meatus, abscesses which apparently showed so perfect a resemblance to those which characterize furunculosis, that we came to that diagnosis, and hoped for a speedy cure by the method of Lewenberg, alcohol borated to saturation, incision of the abscess. But there was no amelioration, and as the meatus had become stenosed, two days later, by the inflammation and abscesses, we repeated the necessary incisions, and after an energetic curettage placed a drain in the meatus. Relief, but not radical. Then the same conditon appeared again. We asked for an analysis of the mass removed from the meatus, which was made by Dr. Beunat. Culture on gelatine at 38°; development in 48 hours. After staining with Kuhne's blue the microscope showed—micrococci, a few streptococci, staphylococci tetragenes; (2) plaques of the same elements; (3) plaques of Kuhne's blue, bacilli and diplococci; bacilli resembling in every way coli bacilli (Beunat). Some days later, the right ear of the patient became affected and a microscopic examination showed, after culture on gelatine, the presence of mycelia and streptococci. Treatment—various solution, sublimate 1-1000, 1% carbolic acid, 10% silver nitrate, tincture of iodine, boric acid, salicylic acid, potassium cyanide, etc. Malt was also tried, with no good results. The idea then came to us to try treatment with alkalines, and cure was reached in 4 weeks, after previous treatment of three months. May, 1904. Having every day completely cleansed the meatus with the curette, of all thrush—purulent secretion, we had the disappointment of seeing it covered again with vesicopustules, some superficial, others deep, surrounded by a scaly and regularly pitted zone, at the bottom of which, a red zone showed the Malpighian layer, the whole covered with a purulent secretion or sprinkled with whitish thrush. After treatment by cleansing and profuse lavage with 4% solution of sodium bicarbonate and 1 pro mil. sublimate, the patient experienced an amelioration which led to a complete cure.

Case II. Sch., German, 25 years old, was sent to us by our worthy colleague, Dr. Wolff, on account of severe pains in his ear, and the hemorrhages which indicated an otitis hemorrhagica externa. The patient had become better after long and assiduous treatment, but while convalescing, and while his meatus was very delicate, he suddenly returned to ask us to examine his left ear. The integument had become red, and was covered with whitish spots, similar to a deposit of frost. No new eruption of hemorrhagic phlyctenulae. Culture and analysis: Mycelium and micrococci. We tried lavage with calcium hypochlorite, which extremely irritated the meatus. Two days later, the right ear was affected. From then on, we used regularly alkalines and sublimate which quickly gave a favorable result, which was a radical cure only after some weeks.

Case III. M. R., young woman, 24 years old, was sent to us by our distinguished confrere Dr. Gaziglia, for a suppuration of the ear, and progressed well towards cure, after we removed a large polyp from the posterior superior segment of the left external auditory meatus. Suddenly she returned to have us see the meatus, and the seropurulent discharge. We found a white mass in the meatus, and each time, the lavage removed small whitish concretions mixed with epidermal scales. Roughness of the dermis of the meatus over which were disseminated innumerable small switish spots. Culture on serum, gelatine and the mineral solution of Raulin. Growth after 48 hours. Microscope of 960-D showed mycelia with their spores, epidermal cells and micrococci. The alkaline-antiseptic treatment, amelioration, very marked. Diffuse cauterization with silver nitrate or zinc chlorid. Result nil. Amelioration evident as soon as we recommended the treatment with sodium borate, etc. After two months, the cure was not yet complete. Departure of patient.

Case IV. M., Monte Carlo, youth 16 years old, anemic, was sent to us by our distinguished confrere, Dr. Colliquin of Monte Carlo, for suppuration of the left ear, which promptly became better on the extraction of a huge polyp from the meatus. There was only a slight oozing. Soon we found, in the operated ear, hemorrhagic phlyclentulæ, detached epidermal scales, and white, disseminated spots. Same culture, same findings, same treatment as Case III. Cure was almost complete in 6 weeks, but treatment should have been continued longer.

All these cases show by their symptoms, as well as by the microscopic examination; the same disease, associated otomycosis. Three of them showed what we said on the subject of inoculation by spores, viz., that an excoriation of the skin or some anomoly of the dermis seems indispensable for the penetration of the gonoids. Furthermore the efficacy of the alkaline treatment answers both theoretically and practically in checking and destroying the vitality of the microphytes, to which an acid medium is absolutely necessary. The cases we have just quoted conform to the resume, with which we closed our study.

LII.

THE TREATMENT OF ACUTE OTITIS MEDIA. REPORT TO THE FRENCH SOCIETY OF OTOLOGY AND LARYNGOLOGY, MAY, 1904.*

By Lermoyez, Lubet-Barbon and Moure.

That we must take care of a diseased organ is one truth, and that we must examine the organ in order to care for it is another. These two affirmations depend upon good sense; unfortunately when applied to the ear, good sense ceases to be synonymous with common sense.

In olden times the otitis was not treated. The ignorance of the physicians was in accord, at best, with the prejudices of the patients, so that they calmly waited for the humors of the ear to purify. The present method is different: the ear is cared for. It may be treated badly; dirty dressing of the auditory canal with soothing ointments, warm oils or laudanum are injurious things. Sometimes the progressive physician prescribes profuse injections of boric acid and carbolized glycerine into the suffering ear; however, the work is still not so perfect that it might not be better.

"But what is it that causes so much anxiety," say the physicians to us. Affections of the ear are, especially in children only insignficant evils which cure themselves. Certainly, they assure us, aurists are mistaken about the pretended gravity of otitis inasmuch as they are only called to treat the grave cases which are sent to them. Such at least is the feeling in certain quarters. What shall we answer? We may say, in the beginning, that it is irrational in our age of technique, to treat organs by conjecture. Should a pneumonia be treated without auscultation? It is better, however, to explain to the physician that they are deceived in their turn by an over amount of faith, when they think that an otitis is well cured because the ear shows no evidence of pain or discharge. It is too often subject to recurrence and full of danger in the future; like appendicitis. The discharge from the ear does not cease; slowly and insidiously it continues in its march to meningitis which kills and deafness which cripples.

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*From Ann. des Mal. de l'oreille, du larynx, du nez et du pharynx, May, 1904.

There is more. A great reproach has come to aurists on the ground that, by their local manipulations, they increase the gravity and the duration of the acute otitis media. Certainly that must be denied, for, after all, is not a plea for the aurist a defense for the ear? However, we admit that since Zaufel showed almost twenty years ago that otitis is the result of pathogenie microbes, we thought that we were obliged to attack them by a series of antiseptic acts which proved to be more zealous than reasonable on our part. Certainly, it has happened more than once that such a suppuration of the ear would have been quickly stopped if it had not been kept up by a series of profuse injections, of vigorous inflations and of repeated bactericidal dressings. But since then, time the great moderator, has passed and from our old errors is born our present experience. The mature epoch of otology does not deserve the reproaches which encompassed its youth. Twenty years of life have calmed its therapeutic furor.

The time has come when the hope of treatment of acute otitis seems to have been realized. This we undertake to show in this report.

THE NECESSITY FOR TREATING OTITIS MEDIA ACUTA.

There are two things which demonstrate this necessity: the gravity of the otitis, whether it is untreated or badly treated, and secondly the benign character of otitis when properly treated.

The gravity of otitis media acuta when untreated or badly treated is demonstrated; 1st by the relative frequency of early complications, mastoiditis, purulent sinuses of the neck and meningitis; 2nd by the facility with which the discharge spontaneously checked, but not drained, may set up remote accidents, caries or cholesteatoma of the petrous, thrombophlebitis of the sinus, cerebral abscess; 3rd by the cicatrization which is often vicious when it is not watched, causing destruction of the drum membrane or adhesion of the ossicles; the patient has then purchased his life for the price of an incurable deafness.

The benign character of otitis media acuta which has been well treated is recognized by the usual absence of these complications. Rapid death, indefinite chronicity and remote deafness almost never occur.

We will not take the time to report cases, numerous and easy to find, which support these two propositions. They are to be seen in the case books of every practitioner. On the other hand, our opponents may present those very numerous cases of otitis media acuta, particularly the mild infantile cases, which are perfectly relieved without treatment. Perhaps they may be so ungenerous as to mention those cases of sub-acute otitis media which evolve with such a virulence and upon such an unfavorable soil that the aurist, even if called at the outset of the disease is powerless to arrest its progress or to circumscribe its dangers. Indeed this argument is weak; by generalizing in the same way it might be claimed that there is no use to treat appendicitis because many cases of light colic called appendicitis cure themselves, and because there exists forms of hypertoxic appendicitis in which surgery is entirely powerless.

The best means of convincing physicians and patients of the real necessity for treating acute otitis media is to establish extensive statistics made entirely by otologists, for they alone observe otitis in a scientific way. This will be composed of two parts. The first group will include cases of otitis treated rationally and in time; they will not fail to show that in these cases rapid and absolute cure is the almost constant termination. A second group will include those cases of complicated otitis, otorrhea, of adhesive otitis which we are called to see when medicine fails—it is doubtless very easy to establish that the origin of almost all these cases is to be found in an acute otitis media which has been untreated or badly treated.

THE RATIONAL MANNER OF TREATING OTITIS MEDIA ACUTA.

A knowledge of the pathology of an affection alone can indicate the rational treatment. We know that acute otitis media is almost always consequetive to an ascending infection carried to the tympanum by the tube; it is a centrifugal affection—rhinogenous. The inverse cases, centrifugal, are rare: those in which an injury of the drum originates the trouble; those in which a myringitis of other origin precedes the otitis. Cases of hemotogenous acute otitis are theoretically imagined in order to fill an empty place in our nosology.

Pathogenic microbes, introduced into the nose by any contagion whatsoever or increased in situ by an attack of cold, spread and multiply in the epipharynx; pass into tube by the assistance of a violent blowing of the nose and arrived in the blind alley which forms the middle ear.

Arrested here, they are installed, some in the tympanum, some in the mastoid antrum, chambers which communicate by a narrow passageway. Very soon they become numerous and attack the mucosa which, however, has already prepared its defences. It is congested, swollen and infiltrated with lymphocytes, and if this first reaction is not sufficient, it secretes mucus or mucopus; an effusion is established; the tube is closed somewhat later because its mucosa contained in an inextensible tube can only swell so far as its caliber allows. The middle ear then becomes a closed cavity—there is retention. On account of this there is pain from pressure upon the sub-mucous nervous plexuses, infection by resorption of the toxico-microbic products, secreted in a region where the tissues are eminently absorbant, and various complications, depending upon the place in which there is an injury to the walls of the middle ear subjected to a progressive pressure. Generally it is the membrana tympani which yields. The symptoms are lightened and pus flows into auditory canal which more or less completely drains the ear. Nature thus decides to evacuate the exudate, inasmuch as, after some days of waiting, the physician himself has not decided to do so. But this perforation is only a fistula with all its complications.

Nevertheless things could happen differently. It might occur that spontaneous perforation of the drum does not take place, either because the exudate is small or because the tube is not so tightly closed that drainage is impossible; this is very fortunate. But the drum may not yield because it is too resistant, so that the pus must seek another outlet through the thin and often fissued cranial walls. This is unfortunate and often grave.

The clinical features of otitis media acuta are therefore variable. The affection differs according to the greater or less virulence of the bacteria, the variable fertility of the soil on which they are cultivated and the age of the individual upon whom they are inoculated.

Text books divide acute otitis media into (a) catarrhal; (b) exudate; (3) purulent. However, this division is schematic, made to accommodate the needs of a classification. In the clinic we pass this by for we know that besides these three forms there are many intermediary, but we do not ignore it as we frequently see the transformation of one form into another in the same person. So guided by it we will consider acute otitis media *en bloc;* it will be for us a unit.

Since, therefore, knowledge of the pathogenesis of otitis dictates treatment, the danger is in the retention, the safety is in the drainage. The treatment of otitis has nothing in it that can be considered mysterious by the physician. It is expressed thus *ubi pus, ibi evacua.* Another thing is equally necessary in order to conduct the treatment of otitis; knowledge of the local anatomic characteristics.

Two points are to be considered in this regard.

I. The different compartments of the middle ear, particularly the tympanum and mastoid antrum, communicate largely with one another. Therefore there is no means of isolating these chambers under normal conditions and every microbic invasion in one necessarily affects all. The result is that otitis media acuta is essentially formed by the association of an antritis and a tympanitis; when there is pus in the anterior chamber, it is also found in the posterior. From an anatomico-pathologic standpoint, there is no otitis acuta without mastoiditis, and if all the mastoids of those suffering from acuta otitis media were trephined, pus would always be found. This happens to some surgeons; they praise themselves but sometimes they are wrong. For clinically it acts otherwise. Whenever the suppuration is discharged easily into the tympanum by way of the aditus there is no clinical mastoid reaction; and the experience of each day teaches that an early opening of the drum in the great majority of cases is sufficient to drain the mastoid. Likewise it often happens that an opportune paracentesis will abort a mastoiditis of great menace which has already been manifested by external disquieting signs. We know then that in all cases of acute generalized otitis media, the mastoid suppurates; we should keep these cases always under surveillance but not always open them.

Nevertheless it is well to add a corrective to this formula. In slightly virulent acute otitis media, the lesion, accentuated especially in the tympanum, is less in the antrum. The inflammatory process is less and less marked as it is distant from the tube, which brought it to the ear. The mastoid in this case only presents an intense congestion with tumefaction of the mucosa which covers the walls of the cavities. There are in addition forms of mastoiditis in which there is more serous discharge than pus, which are capable of cure by resolution without surgical intervention (Moure).

2. The middle ear from a philogenetic standpoint is only a diverticulum of the superior respiratory tract, a prolongation which is interposed between the anditory network and the skin which protects it. An acute otitis media, therefore, is an affection of the respiratory tract; besides we know with what facility and constancy these infections are diffused throughout the system; it is not astonishing, therefore, that otitis media, an affection of the otic portion of the respiratory mucosa should be accompanied by a salpingitis, a pharyngitis, rhinitis and epipharyngitis. Not that there is an assembly of distinct affections, but rather the simple diffusion of the infection to the entire naso-tubo-tympanic system so united.

The contrary could not be understood. We see then that it is an error to restrict the treatment to a specially individual one, to that by way of the auditory canal, an error daily committed. The disease is general, the therapy should be general.

More than this—not only is the diseased ear a part of the upper respiratory tract, but it is also, we should not forget, a part of an organism. There are three indications for the treatment of acute otitis media:

1. To treat the ear.
2. To treat the nose, pharynx and epipharynx.
3. To treat the general condition.

1. TREATMENT OF THE EAR.

The local treatment of acute otitis media may be stated as follows:

Two indications. Seek to prevent (1) The immediate accidents resulting from the exudate; means to employ, evacution, drainage, imitating nature in this. (2) Remote incidents of chronicity, resulting especially from secondary infections; means to employ, antisepsis or (better) strict asepsis, sterilization of the field of operation, instruments and dressings, imitating the surgeon in this.

We should be radical upon the second point; No concession is possible. The neatness of the aurist does not suffer by discussion. Only, let us remember that the middle ear has two entrances, two ducts, the canal and the tube giving access to the tympanum. These constitute a cavity like the letter Y. Precaution observed at the tympanic entrance will be of no avail if the tubal entrance is neglected—what we wish to say is that we should not forget to treat the ear and the epipharynx at the same time.

Upon the first point, however, there is occasion to be opportunistic. The utility of an artificial evacuation can and should be discussed. For it is not everywhere that paracentesis is systematically rejected, with the school of Prague, or practiced invariably, as taught by the school of Munich; otology is not yet an exact science. We will then insist upon these questions: When is it advisable to evacuate the exudate artificially? How should this evacuation be made? How should drainage be assured?

The pivot about which our conduct in the treatment of otitis media acuta revolves is the consideration as to the time when we are summoned to take charge of the case. Very different will be our manner of treatment according to whether or not we intervene before spontaneous perforation of the drum, and very different also will be the efficacy of our intervention in the two cases. We are called upon to consider the following: *before*, we are still masters of the situation; we may by an active and energetic treatment arrest the affection in its course, sometimes even abort it; *after*, we can only submit to the course of events. We must accede to these things without pretending to provoke an arrest, still less a regression; we content ourselves with watching the flows of pus, with draining it in order to make it inoffensive. How much greater advantage it is for the ear which we treat at the proper time, in the beginning of the disease than later when the discharge is established. So therefore the treatment of the preperforative phase and that of the post-perforative phase is absolutely different.

Preperforative Phase. The tympanum has not spontaneously perforated. Pain is the dominant symptom, the primary indication is to calm it. How can this sedative be obtained? By various procedures, dependent upon the cause. This may be due to a simple inflammation hyperemia or to the presence of an exudate with pressure. If the last is constant it is always necessary to incise the tympanic membrane so as to kill two birds with one stone: in order to relieve the tension in the tympanum and to prevent the complications which may result from the burrowing of pus or from its continued sojourn in the ear.

But otitis does not always present this condition of things. Very often there is only a predominant hyperemia and opening the tympanum is then entirely useless.

In resume, the problem to solve before all when we are called upon to treat an acute otitis is the following: is there or not an indication for performing paracentesis of the tympanic membrane. Certain otologists solve the question in a very simple manner. "Incise the tympanic membrane by all means. A paracentesis correctly and properly made is harmless. The worst that can happen is that it was unnecessary."

This argument for uniform surgery is deficient from one standpoint, that it is extremely difficult under ordinary conditions to make a paracentesis absolutely aseptic; besides even with an irreproachable sterile needle we risk the aggravation of an otitis which has ceased to suppurate. Surgeons are guarded about incisions in acute lymphangitis. We are to be careful of an excess of zeal to evacuate the tympanum as a reaction against the abstention of former times. Against the practice of the old aurists who permitted the tympanic abscess to "ripen and break" by poulticing the canal, we are to-day inclined to incise the tympanic membrane too lightly and too often. A little moderation in this regard will suggest a better policy. We are always more likely to err by excess than by omission. There are then two cases to be considered, those in which paracentesis should not be performed and those in which it should be.

1. Cases in which there is no indication for paracentesis of the tympanic membrane. When pain in the ear is not continuous, when the acuity of the diseased ear is not notably lessened, when the fever is slight, when cerebral reactions are absent, paracentesis of the tympanic membrane is not necessary even when it is red and tense. Later on we shall specify what are the conditions which require incision of the membrane; it is sufficient now to discuss the opposite. Let us then see what should and what should not be done.

(a) The middle ear may be acted upon, through the auditory canal in an immediate manner, and mediately through the periauricular region. On the one hand the canal may be filled several times a day with warm carbolized glycerine which has the double power of calming the pain and of disinfecting the external ear preparatory to future intervention. Without doubt carbolic acid has an abortive action on non-specific inflammations, for instance, its action on lymphangitis. Carbolic acid is, it is true, very irritant, but glycerine has the property of reducing its caustic action without modifyng its qualities, so that the glycerole which many physicians, a *priori* fear to use is well supported by the skin of the canal and tympanic membrane provided that the glycerine is strictly neutral and the carbolic acid absolutely pure. A dilution of one to twenty or one to ten is sufficient for an adult and one to forty is preferable for a child. Applications of Bonain's liquid acts very well as a resolvent in a dry canal.

On the other hand application may be made over the whole periauricular region, of gauze compresses dipped in boiled water as hot as possible and by a bandage. This is renewed as soon as it becomes cool.

(b) On the contrary, the canal should not be made unclean, the drum injured or the tympanum infected. Therefore we should use no laudanum, no soothing balsams, no oil of sweet almonds in the auditory canal; no injections of boric acid, which, by striking the drum, opposes the general law that every diseased organ should be kept at rest. And we should not use air douches through the nose, which agitate the tympanum and its articulations and in addition force in germs from the epipharynx which perhaps could not penetrate of themselves.

In the fortunate cases, and they are numerous, the resolution of the otitis is assisted by the application of this mild treatment, in fact it is accelerated. Under its influence the pain disappears whether it is spontaneous or provoked by pressure over the mastoid and audition is re-established while the speculum shows a drum membrane, becoming pale, which is retracted. The clinical sense teaches one when to discontinue this treatment; the hot applications need only be continued until the pain disappears—they are the first to be withdrawn.

When, on the contrary, these mild therapeutic measures fail, we may then, if we have waited long, proceed as in the following case without delay:

(2) *Cases in which there is an indication for paracentesis of the tympanic membrane.* There are three major indications for paracentesis of the tympanic membrane:

(a) Pain, provided it is continuous, and what is more positive, increasing. Thus attacks of transitory otalgia, such as the nocturnal ear crises of children, if they disappear quickly upon awakening of the child, are not a formal indication for intervention. They give evidence generally of a congestive attack by spontaneous resolution.

(b) Deafness, provided it is recent and very marked. An ear previously normal, which does not hear low voice at a few centimeters distance is certainly filled with an abundant exudate even if there is no pain. Immediate evacuation is called for in order to prevent ear troubles of lasting duration.

(c) Fever and poor state of the general health, provided they depend upon the ear and not upon the protopathic affection, causing the otitis (grippe etc.) or upon another concommitant affection (bronchopneumonia, tonsillitis).

It is necessary to intervene especially when there are cerebral symptoms which occur so promptly in children.

The local indications furnished by the appearance of the drum while they are certainly useful are only of second rank in importance. However, a bulging drum coincident with the preceding symptoms can only add a new argument to the cause of intervention.

If there is a want of agreement between the local and the general symptoms, the signs furnished by the speculum should not be allowed to supply confidence in this particular. Certainly when pus is seen clearly through a drum ready to rupture, incision should be made at once; but such a picture is rare. Generally the tympanic membrane is not so clear; however, it is not to be forgotten that this membrane when it is simply swollen by a pocket of inflammatory edema may wrongly appear as a tympanum filled with pus under pressure and inversely, a thick sclerosed tympanic membrane may not show externally what lies behind.

The result therefore of these considerations is that every attentive physician called upon to treat an acute otitis, even when entirely unskilled in making an examination of the tympanic membrane can and should understand the indications for paracentesis.

The technique of paracentesis is too classical a matter to figure long in this report.

The instrument of choice is a lance-shaped knife, mounted preferably upon an independent handle. It cannot be too sharp; in this respect it is well to imitate the practice of surgeons who have their bistoury resharpened each time it is used.

The sterilization of the knife is indispensable but delicate. Burning which, in order not to be illusory, must be at red heat can not be used; sterilization at a dry heat of 170° dulls it; boiling for five minutes in a vessel filled with carbonated water is preferable, but it is still better to keep the knife for ten minutes in a tube of chloroform in which it does not sink and in which it may remain indefinitely provided it has been previously well dried.

Disinfection not only of the canal but also of the vestibule of the ear is an obligatory precaution in order to prevent secondary infection of the tympanum. This, however, is superfluous if the canal has been bathed in carbolized vaseline for several days; indispensable in the other cases in which dirty dressings have been used. The use of soap, washing with water then alcohol may easily be practiced in the canal with the aid of a cotton applicator, finally bathing the ear for ten minutes with a one to one thousand solution of mercury bichlorid and finally thorough drying. Anesthesia of the membrane should always be attempted, though it is not always successful. Nevertheless the pain caused by paracentesis is of such a character that it is absolutely necessary to attempt to prevent it.

Bonain's mixture:—
Crystallized carbolic acid.
Menthol.
Cocain hydrochlorate aa 2.

is the least unsatisfactory of the anesthetics. A small pledget of cotton well saturated with this mixture is easily spread upon the drum which upon contact becomes blanched and insensible.

This anesthetic may be reproached for inconstancy. The fault is often with the physician, who does not know how to use it. The following errors of technique prevent the good effects of the anesthetic without compromising its value: not completely drying out the canal in advance, neglecting to free the drum from the epithelial mass which covers the drum, not waiting a sufficiently long time, about ten minutes, introducing the knife beyond the limits of the anesthetized zone, striking the nerve plexus of the promontory. This anesthetic has been blamed for producing a scar which after contraction, leaves a destruction of the tympanum, extensive and often durable. This inconvenience is caused by a badly prepared mixture in the manufacture of which a trace of alcohol has been permitted to enter. It is often of advantage to have a large perforation which is slow in closing. It is the best assurance against a mastoid operation. It is evident that in unmanageable children and in nervous adults, the local anesthesia is as painful as the paracentesis itself. In these cases general anesthesia is imposed. A little bromid of ethyl or a few whiffs of somnoform (Moure) are sufficient to secure anesthesia for the few moments required. In an extreme case chloroform may be given, but this is making the operation one of great importance. Theoretically the incision should be made in that region of the drum which is always dependent whether the patient be standing or lying down; that is to say in the postero-inferior quadrant or the antero-inferior quadrant (Moure).

Practically it is often made in the part of the drum which is bulging. It is important not to make a timid perforation, too short or too slightly penetrating. Depending upon the case or upon personal preference a linear or crucial incision may be made; or also, in order to aid the orifice in remaining open, a crescent shaped valve may be made looking below and behind.

Having performed paracentesis one or two Valsalva inflations should be made for the purpose of verification, or in extreme case, a Politzer in order to determine by the sounds of the air and blood in the canal whether or not the incision is sufficient. But the maneuvers of aerations should be limited to this. The blood is stanched with cotton applicators. A piece of sterilized gauze of fine mesh should be loosely applied throughout the length of the canal for drainage purposes without obstructing it and the meatus is filled up with hydrophile cotton. A cotton compress should cover the auricle and its surroundings, sufficiently thick, as to prevent the pus passing through it, with several turns of a bandage, fix the dressings around the head. Let us forget for a moment that we are aurists and let us consider ourselves surgeons opening an abscess.

The question of the after treatment of an ear upon which a paracentesis has been performed is the point which divides otologists. And yet nothing is more elementary than to apply to the ear those grand rules of modern, general surgery, drainage and asepsis. One can hardly comprehend that this should be a matter of discussion.

As an abscess is evacuated when it is well opened, so the middle ear should be emptied of pus without being constrained or aided by artificial means, which is the case when the paracentesis is properly made. It should be the incision of a surgeon and not the mere puncture of a general practitioner. However, when the incision is once made, there is only one more thing to do; to provide for drainage of the pus down from the tympanic orifice but to provide for it in a proper way. However, such attention can not be confided to the patient or his family. Those who, after the incision is made prescribe instillations, douches and frequent injections, which by reason of the repetition can only be given by unclean hands, are responsible for much damage to the tympanum for it is repeatedly infected and thus by reason of their treatment they prolong the discharge until it becomes chronic. Is it to be supposed that a surgeon after having incised a phlegmon, would permit the husband or maid to introduce every two or three hours into the abscess cavity divers fluids differing chemically, but invariably septic?

It would be better to make the dressings less often than to have the dressings dirty. On the other hand the less one touches the wound the more rapidly it will be cured; the less one disturbs an ear upon which paracentesis has been made, the quicker it will become dry.

A single dressing of the ear per day amply suffices discharge, but the dressing should only be made by a competent physician that is to say one skilled in asepsis and accustomed to use the otoscope. There must be absolute interdiction against any one else dealing with the operated ear or the dressing materials. The same respect should be bestowed upon incised tympanic membrane as upon an abdomen upon which section has been made.

The technique of the daily dressing should be regulated as follows:

(a) Remove the external dressings; irrigate the concha and the periauricular region; examine the mastoid with the finger and the eye; investigate carefully the slightest retroauricular swelling comparing the two ears, looking at the patient from behind; finally make slight pressure upon the three classic portions of the mastoid, the apex, base and posterior border.

(b) Remove with a pair of forceps the gauze which drains the canal and consider the odor, color, consistency and abundance of the secretions which it has taken up.

(c) Wipe off gently but carefully the walls of the external auditory canal, keeping it under control in full sight, using an applicator which has been properly sterilized and prepared; note if there is an otitis externa and above all find out if there is a tendency to a depression of the postero-superior wall.

(d) Examine attentively the drum and its perforation in order to determine the degree of retention in the tympanum, according to the quantity of pus which drains spontaneously through the opening, some time after it has been cleaned—a capital sign, often neglected.

(e) Introduce with proper forceps (without teeth—in every case, not those which were used to remove the soiled dressings) a piece of aseptic gauze as long but not so wide as the canal, which should not be pressed in as a tampon, but on the contrary spread out from the perforation to the concha.

(f) Place a tampon of hydrophile gauze in the concha and over the whole region a compress of cotton thick enough to prevent the pus from passing through.

(g) Retain the dressings with a bandage tightly adjusted to the head or some other method of bandaging may be preferred. However, avoid bandage of black silk which as they cannot be washed each day may prove a source of infection.

Is it necessary to say that before beginning the dressings the hands should be washed and the vessels should be sterilized with a flame, likewise the instruments, especially those which have not been previously sterilized with dry heat.

In this way, the dressings of to-day are made proper for the suppurating cavity.

Various objections are made to this new mode of dressing by an otitic tradition which is offended at its novelty.

Here is what is said:

(A) Why put a piece of gauze in the canal? The osteo-cartilaginous canal, always wide open in an excellent natural drain which empties the tympanum. Gauze is useless, perhaps harmful, because it tends to obstruct the passageway. Is it not said that the drain drains and the gauze tampons?

Certainly if the gauze wick is too large or if it is badly introduced, it acts as a stopper, but the fault is entirely in the dresser, no more and no less than if he desired in a wound a drain which was too short or impervious. However, let us not confound gauze wick with tampon. A wick—a lamp wick if you wish, is according to definition, a conductor which draws up a liquid in a reservoir and conveys it up to dry portion. This same wick correctly placed in the ear draws up the pus as soon as it passes out of the tympanum and directs it towards the mass of absorbant cotton which retains it. Without the wick the pus can only be carried passively from the tympanum, it accumulates in the canal the walls of which it covers and only arrives at the concha when propelled by the *vis a tergo.* With the wick the pus passes out of the tympanum actively, pumped out almost as soon as formed. It is not arrested in the canal but is immediately drawn by capillarity towards the absorbant cotton. And not only does the wick prevent the flow of pus from stagnating in the canal but it creates a current of centrifugal exosmosis (experiment of Preobajensky) which opposes as long as it lasts the centripetal microbic invasion coming from the exterior.

(B) Why not make injections into the canal? Let us answer that these injections, which ordinarily complicate the technique greatly, are susceptible to three objections.

(1) They are useless. The wick well placed in the canal ought to drain all the pus from behind and the applicator in the direct examination assures the cleansing of the external ear in a manner most instructive for prognosis.

(2) They are infective. We do not conceal the fact that it is almost impossible in the city to make a douche extemporaneously truly aseptic; the water is rarely sterile, the receptacles are doubtful and the syringe easily contaminated.

(3) They are irritating. They injure the tympanum causing sometimes pain and vertigo and all this without much profit because they cannot clean the diseased cavity as they are forcibly arrested at its threshold. Besides modern surgeons do not any longer wash wounds, nor irrigate well-opened abscesses, and gynecologists are abandoning profuse injections in patients which they may look after themselves. However, when the discharge is very abundant and when the patient is not directly under observation, ear douches may assist so we cannot condemn douches absolutely. (Moure).

(C) Why not use air douches at each dressing? Is it because politzerization is to be blamed for provoking artificial mastoiditis by projecting into the mastoid cavity pus coming from the tympanum? But it is known that this blame does not hold because it is demonstrated that there is not otitis without antritis. The air bulb cannot create what already exists. All this is very true but there are other reasons for opposing the regular use of the air douche in the course of the dressings of otitis acuta. The air douche is evidently injurious; injurious, because it gives severe shocks to a region which should be at rest; injurious because it forces brutally towards the diseased ear the septic secretions which are seldom absent from the epipharynx; harmful perhaps by risking contamination of the sound ear, although this point has been sharply contested. And besides it is of no utility, for one of two things occurs. Either the tympanum is well emptied and air inflation is not altogether necessary or it is not well emptied because the tympanic perforation is not large enough. In this case, paracentesis not politzerization is necessary.

But the air douche should not absolutely be condemned. Sometimes its relieves the head in certain patients; it may be authorized in exceptional cases when the acute period subsides. (Moure).

(D) Why should not antiseptic substances be placed in the canal? Have carbolized glycerine and sublimated glycerine lost their bactericidal property?

We claim that these drugs are altogether useless because they do not penetrate to the seat of disease and do not enter the tympanum; and furthermore, if they do enter, they are immediately destroyed by the pus which fills it.

But there is a more serious accusation to formulate against these substances. They favor otitis externa, which causes the patient prolonged suffering and renders the dressings very painful, not counting that it interferes with the proper drainage of the pus. How then is this complication caused by their influence? Very easily in the following way: So long as the epidermis of the canal remains intact, it endures without reaction the pus coming from the tympanum. There is applied a strong antiseptic agent which causes a slight necrosis of some of its epithelium and lays the dermis bare in certain points where inoculation takes place, and thus is created a pyodermitis, which is rapidly diffused over the whole canal.

It will, we hope, be conceded that the comparison of the modern treatment of acute otitis with the old practice (antiseptic douches, injections, inflations) is of advantage to the former. Impartial observation of a series of facts oblige us to give it preference from three points of view:

(1) Because it is much more convenient for the physician.

(2) Because it is much less painful for the patient.

(3) Because it notably shortens the duration of the otitis, particularly for the reason that it does not prolong it.

We cannot repeat too often, for it is not well enough known, that when the tympanic membrane is perforated the importance of the aurist, very great up to this point, is suddenly restricted. Before, we directed the results, now, they in their turn lead us. So in spite of the best treatment applied, the otitis may go on according to circumstances to a good or bad evolution.

(A) *Favorable Evolution.* This is characterized by the fact that the wonderful relief which succeeded the paracentesis continues to the end of the disease and it is due to the perforation being maintained sufficiently open during the whole time that it is necessary.

Generally in spite of the painful symptoms ceasing almost immediately the suppuration persists in the same degree for some time, then it lessens and stops about the second or third week. This is produced or announced by the cure of the epipharyngeal catarrh which beginning some days before the otitis, ends sooner—an excellent omen when despairing on account of the tenacity of the discharge. All the more reason, is it not, to care for the epipharynx?

The speculum teaches us that this cure may follow two different otoscopic methods:

(a) In the first series of cases (the light form) the cure takes place from the depth towards the surface. The tympanum is already dry when the tympanic perforation is still wide open. It is sufficient to insufflate into the bottom of the canal a little boric acid powder and to leave the tympanic membrane close slowly under this protecting cover—dry dressing renewed every two or three days. However, the first dressing must never be left longer than twenty-four hours in order to watch the effect. As nothing is to be feared a strict surveillance is not necessary.

(b) In a second series of cases (rapid form) the cicatrization of the tympanum is very rapid, while the middle ear still suppurates. There is, however, no pain and the deafness diminishes, the unobstructed tube evidently suffices for drainage. However, this mode of cure ought to give us and in such patients a close observation should be instituted; their mastoid should not be lost to view. It is in these cases that delayed mastoiditis breaks out several weeks or months after the disappearance of the discharge.

(B) *Unfavorable Evolution.* This is the case, when in spite of the paracentesis the relief sought for is not obtained, The perforation is insufficient to assure the necessary drainage, or the orifice is too small or closes too soon. The classical signs indicating paracentesis reappear; it is necessary to begin all over again, but this time we must bė radical; the incision must be very large and positive. Is it necessary to make a paracentesis in these cases of unfavorable evolution, where the pain diminishes but litttle or the drainage is poor? It will be wrong to insist upon this intervention which under certain circumstances may do no good.

If it is true that a primary paracentesis amply and properly done is often sufficient to assure drainage of the pus throughout the duration of a benign otitis, it is not at all uncommon, especially in the young in whose tissues the reparative process is strong, to call for a second operation, but rarely more than this. For, if the retention persists in spite of this, it signifies a more prolonged attack. By insisting on paracentesis of the drum, useful time is lost that should give way to paracentesis of the antrum; to trepanation of the mastoid.

POST PERFORATIVE PHASE. *The drum perforates spontaneously.*

We have been called too late. This is regretable. We must put this question to ourselves: *"Is the spontaneous perforation sufficient or not to drain the middle ear?"*

(1) The signs that it is *sufficient* deal first of all with the general state. Absence of fever, cessation of malaise, the local condition, the permanent disappearance of the otalgia all indicate that the drainage is good. Local examination is of great aid in corroborating these good symptoms. If the canal has been cleansed, and the drum has been wiped with cotton and then the pus does not reappear through the perforation during the treatment, there is no serious retention in the cavities of the middle ear except in cases of distant inflamed cells; these however, betray themselves by their limited zone of pain. Nevertheless, however, favorable, the local signs are difficult to interpret in the young whose drum, very oblique, red and always swollen, seems to be confounded with the superior part of the canal, pushing the perforation into an unexplorable pretympanic sinus.

(2) The signs of an *insufficient perforation,* are simply the opposite of the above.

Naturally our conduct in the two cases is different. There is no need to demonstrate that.

If the spontaneous perforation is sufficient, and everything is getting along alright, it is sufficient to treat the ear exactly as after a usual paracentesis.

If it is insufficient, it should at once be enlarged with a knife, or, if necessary, a curette is used to remove the endotympanic mass which acts as a plug.

We now have our otitis media acuta cured. The discharge has ceased. The drum has taken on its former appearance. Our efforts are not thereby checked. We must still overlook the return of audition, the disappearance of the subjective noises, and sometimes even give aid by artificial means, air douches, massage of the drum. But let us refrain from an impatience which will cost the patient dear; let us be wise enough to wait to see if nature is not sufficient for this reparative process: *for a too hasty mobilization of the middle ear is able to relight a badly extinguished process and to start again the otitis.*

Two or three weeks' expectative treatment are a minimal requirement.

It is still necessary to suppress the cause of the otitis, to re-establish nasal respiration, to remove large tonsils, especially to cleanse the *cavities full of vegetations,* all of which must be done at the proper time, gently, conveniently and avoiding everything acute which can mar the success. Thus we take part in the favorable statisics of those surgeons who are wise enough to operate *in the cold.*

Variations in the Treatment Caused by Peculiarities of Certain Otitides.

The type of otitis media acuta which we have described is that of the normal otitis of adults. Now, age modifies the course of this affection and compells us to modify our tactics. *Infantile Otitis* especially deserves our attention. When it is not engrafted on a grip or scarlatina, which greatly magnifies it, it is one of the little incidents of childish health, characterized by nightly aural disturbances, which cause the mother little worry because all children are subject to them, and by transient discharge, with which the doctor does not concern himself, believing it is due to an otitis externa. And as these little crises of the ear seem short and inoffensive, no importance is attached to them.

Well, they are very grave, these little otitides of the little ones, for they usually return and each time push the ear a step along the declivity that leads to the abyss of deafness, without the possibility of remounting.

Therefore they must be treated actively. But, though the symptom is in the ear, the disease is elsewhere. Let us not lose our time in paracentesing the drum, which will perforate of itself, or in draining the middle ear, which knows how to spontaneously empty itself in a few hours. From the canal, let us do only what is absolutely necessary. Let us direct all our efforts towards the throat, especially the naso-pharynx. Let us as carefully as possible remove the adenoids. It makes little difference that they are barely perceived by the mirror, for the most dangerous for the ears are those which are diffused over the extent of the cavity, or are hidden behind the tube. They do not obstruct, perhaps, but they are certainly infectious and should disappear. Let us not forget that we are more often able to prevent than cure deafness.

Cases of Senile Otitis have in reserve many disagreeable surprises for those who do not know them well. They, like senile pneumonias, are pregnant with dangers, but meager in symptoms. The ear of the old is unable to react intensely. It gives few apparent manifestations, almost no pain, a larval fever, and a drum sometimes scarcely reddened. But behind this mask of aural indifference there is hidden a suppuration which spreads in time and space, which invades the entire extent of the mastoid, by virtue of the vast senile pneumaticity, which become chronic with an alarming facility.

An energetic treatment, instituted at the proper time, is the only means of preventing its evolution. In the old patient affected with or suspected of having an otitis, we make the paracentesis rapidly, systematically and of large size.

It would be to prolong beyond measure our report, if we were to mention in detail the various types of otitis on which congenital or acquired anatomical peculiarities of the middle ear press a special seal, such as *encysted otitis,* an otitis limited to tympanal recesses, which is very frequent in the course of grippe. They are the abscesses which bulge out the posterior superior quadrant of the drum, and demanding an early paracentesis, without which, on account of their position, they have a tendency to empty themselves by way of the aditus. Then there is the *otitis of artero-sclerosis* which developes in certain arterio-sclerotics behind a thickened drum, always treacherous, for the membrane refuses to be perforated by the pus, which it stops by an unbreakable aponeurosis, while the atrophic mucosa of middle ear and antrum does not cause sufficient pain to justify paracentesis; at least if these pains exist, they take the neuralgic form, which deceives the doctor. So then, without pain annoying the patient, without the distinct tympanic picture, as in the classic forms, capable of warning the physician, the otitis is revealed only by encephalic explosion. Therefore, at the least doubt, incise the tympanum, crucially or valvularly; for the rigid membrane prevents the lips of the wound from separating and they immediately close again, so that an opening is maintained only if there is a true hole. The galvano-cautery is here to be preferred to the knife for paracentesis. (Moure.)

This form is rare, but that is no reason for the aurist to be indifferent to it, for when he meets it for the first time, he will be astonished, and will be lucky if he has not cause for sorrow.

II. TREATMENT OF THE NOSE AND PHARYNX.

Before, during and especially after acute otitis media, the tubal entrance to the middle ear should be protected from infection, even more than the tympanic. The naso-pharyngeal treatment certainly acts more as a prophylaxis than as a cure of the otitis. Nevertheless we often see suppurations of the ear stop from the time that the nose and naso-pharynx are cleansed, and infants who seem to have a discharge from the ears are frequently simply "blowing their noses" through the auditory meatus.

Therefore, during the otitis, precautions should be taken to prevent ascending tubal infections. (a) Above all, compel the patient to blow his nose correctly, alternately through each nostril. (b) Assure relative asepsis of the nose, by snuffing up several times a day, boric-cocain vaseline (Moure); better still, by injecting into the child's nose, with a Marfon's syringe, some sterilized mentholated olive oil, or by prescribing to adults frequent nasal inhalations of menthol-water by means of an appropriate spray. (Lermoyez). (c) Maintain health of the mouth by frequent cleansing, preferably by gargling with salt solutions.

Later, much later, *in the cold*, prophylatic operations, spoken of above, should be performed on the nasal and pharyngeal regions. In rare cases it may be necessary to perform adenectomy during the otitis, in order to cut short a discharge kept up by the cavum. Nevertheless, one cannot be too careful in this respect, so great is the risk of complication, hemorrhage and mixed infection following an intervention made *in the heat* on a cavum full of pus, and in a bad phagocytitic condition.

III. GENERAL TREATMENT.

Whoever has an acute otitis, however small its virulence, should cease from his daily occupation and undergo severe hygiene. Every febrile inflammation of the air passages, acute otitis or bronchitis, demands rest at home, at least during the first few days. Among the poor, the difference in the prognosis for those who are put in the hospital and those who attend the policlinic is truly striking.

If the child has fever, it should be kept in bed, with batting wrapped around its legs. For cold of the ear, there should be done what is done for colds of the lung. Naturally these hygienic measures, more rigorous in winter, should be modified according to circumstances. The first day that the patient leaves the house should be a pleasant one.

Relative diet, movement of bowels, pleasant surroundings are routine prescriptions, but useful.

In the second place, the protopathic disease, during whose course the otitis appeared, should be treated; so quinin should be given for grip, etc.

In the third place, it is sometimes good to prescribe soothing medicines, which give repose to the patient at night, antipyrin and especially chloral are advised; but not opium, which congests the head and causes a recrudescence of the pains on awakening. This must be done without interfering with the local treatment, which alone gives the true relief.

Finally, certain cases of acute otitis are contagious (Lermoyez). It is best to isolate them in a relative manner, as is done in families where several children are afflicted with measles and one of them in addition is attacked by a broncho-pneumonia or a secondary otitis, affections transmissible in themselves.

INDICATIONS FOR MASTOID TREPANATION.

It is well known that there is no otitis media without involvment of the antrum. The almost constancy of this pathologico-anatomic fact leads to an ideal and theoretical treatment of suppuration of the middle ear, based on systematic antrotomy. There is no question that if a large and direct drainage of the mastoid is established, complications will be prevented and audition will be better conserved. This is what is done by many surgeons, who from lack of knowing how to study a drum, trephine because they are unable to do paracentesis; a thing which at any rate, is less dangerous than the expectant medical treatment.

But let us admit that this would be a great exaggeration. Clinical experience shows us that a resolute aseptic, local treatment, a timely and sufficient paracentesis of the drum, will usually suffice to cure the antritis, by providing its drainage by way of the aditus and middle ear. Furthermore, daily facts show that cures are obtained thus more rapidly than can be obtained by a fortunate antrotomy.

Systematic trepanation, inspired by the constancy of the antritis, should give place to conditional trepanation, demanded by a clinical mastoiditis. Furthermore, mastoid involvments are almost always due to a *cellular* retention, not an antral one, an inflammation of the cells, which is situated in different regions of the temporal bone, often aberrant, and which is manifested often by very different symptoms, according to its location, and especially the construction of the temporal bone.

Therefore, when one or two large paracenteses of the drum have been insufficient to cause the disquieting symptoms to disappear; if constant and spontaneous pains persist in the region of the mastoid; if the base (antral region) the superior border, or the tip of the apophysis retains, in spite of everything, an intense sensibility to pressure, above all, if there is a retro-auricular or retro-mastoidal swelling; if the pus reappears in the field of the speculum in great abundance, after wiping the perforation, or appears in successive abundant discharges preceded by pain, if the brain reacts, if the labyrinth protests, it is necessary to complete the myringotomy with an antrotomy.

It is right, if the symptoms are not pressing, to attempt abortive medication of the mastoiditis (1) by creating a larger tympanic orifice; (2) by applying ice continually to the mastoid apophysis (Lermoyez); (3) by frequent warm lavages of the middle ear by the tube (?) But such a treatment, certainly more dangerous than intervention—because time is lost—should not be continued longer than two to three days; at the end of this delay, if the amelioration has not appeared, it is necessary to trephine the mastoid at once.

And this trepanation should be nothing less than economic. It is necessary to search for the antrum and always open it, and not to confine oneself to that, but also to remove the cortex of the apophysis in order to be able to empty its cells, however aberrant. The more radical the operator, the better for the patient. We cannot approve of the parsimonious operations, the partial trepanations limited to the cells and which respect the antrum; the risk run is truly too geat.

From these facts, which we all have observed, and from the trepanations of the mastoid which we have done, results this axiom, that during an intervention, *the lesions are always found more extensive than was supposed.* For let us not forget that while we are watching the external cortex, there is hatching unknown to us, at the internal cortex, more constant and more severe destruction. At the most, we see only the external wall of the mastoid, behind which are occurring things never dreamed by us.

But who of us has ever repented of having opened the mastoid too extensively or too soon?

SOCIETY PROCEEDINGS.

FRENCH SOCIETY OF LARYNGOLOGY, MEETING MAY, 1904.

By Lermoyez, Lubet-Barbon and Moure.*

The Treatment of Otitis Media Acuta.

Luc.—Gentlemen, I have read, with great interest, the report on acute otitis signed by three of the best names of our society, three names which are unanimously considered to be synonymous with great clinical judgment and large experience in aural surgery. I am glad to say to the three eminent authors of this work, that I agree with the majority of the opinions expressed by them in their work. I agree especially with their conception of the phenomena commonly called mastoiditis, which I, as they, think deserves rather the designation of mastoid retenion, since the mastoid antrum could not fail to partake of the suppurative process arising in the middle ear, of which it is the direct posterior prolongation.

I find furthermore that our colleagues have designated, in a manner excelled by none the indications and contra-indications of paracentesis in acute otitis, condemning equally the abuse and systematic rejection of this little operation.

On these different points, and also on the indications for operating on the mastoid process, I agree absolutely with the opinions of my three colleagues.

On other points, I confess, that I disagree. Our colleagues appear to have a high opinion of the importance and efficacy of our treatment on the progress of acute otitis media. According to them, acute otitides may be divided into two groups, on the standpoint of the prognosis, those which have well treated, of course by otologists, and those which have been treated by the layety or not at all.

The first get well quickly and completely, as a rule, and leave the patient with neither objective nor subjective trace of their presence. The others, however, always have the present menace of intra-cranial complications, and the future menace of a long course and a diminution in hearing.

But when we have made this paracentesis whose alleviating and salutary action I recognize fully as well as my colleagues, and which I like, they make as large as possible, what means have we at hand to manage and to direct in the most favorable way, the further course of the disease? Our colleagues express themselves very clearly since they object to lavage and air douche and confine themselves to the daily introduction of a piece of aseptic gauze to the depths of the meatus. They believe that thanks to the hydrophilic action of the gauze they are able to drain the suppurating middle ear in a manner that best conforms to the principles of surgery.

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*See page 648.

Now, gentlemen, I think that is a pure illusion.

Understand me; no one is better convinced than I of the wonderful efficiency of hydrophilic tampons in chronic otorheas where a great destruction of the tympanic membrane renders possible the entrance of the piece of gauze to the bottom of the cavity, that is to say to contact with the suppurating osseous surfaces, providing of course that the antrum is not affected. But I cannot oppose too strongly the identification of the latter conditions with those which we find in the case of acute otitis media suppurativa.

My colleagues are entirely right in recommending and making a paracentesis of the drum as large as possible, but you will have to make it very large, the very largest possible, allowing for shrinkage, something that never fails or is even delayed, and it will still be too small for the extent of the cavity to be drained, and the drain will be stopped at its margin, intead of entering to the suppurating foci, as it should do in order to be a proper drain.

This is my opinion. When there is an acute abscess of the ear, and a large incision has been made in the drum, our effect upon the further progress of the suppuration is absolutely nil, and our role is confined to watching for complications, against which we may employ our most brilliant surgical talents. In short, when we have a suppurating ear, we cannot see its behavior, and have almost no effect, through the perforation, on the suppurating focus.

We drain nothing, and we disinfect nothing for the excellent reason that we have no access to the focus itself. But see how the situation changes when signs of mastoid retention authorize us to make a large opening into the antrum and by this artificial path to disinfect the suppurating focus and to drain it from the bottom. At once the suppuration ceases as if by enchantment. It is that which made me say two years ago, that the most beneficial thing that could happen to a patient with an acute, profuse suppuration of the ear, destined to last a long time, would be the appearance of mastoid complications, which would allow the specialist to perform an operation, which alone allows complete disinfection and true drainage of the focus. Since, to-day, thanks to our technique, we obtain in a fortnight the cicatrization of the retro-auricular incision when the antrum has been opened in acute cases, and since local anesthesia is enough for the operation, I claim that in the near future this will be the treatment of predilection in otitis media acuta suppurativa, with a profuse discharge, even in default of signs of mastoid retention.

And now, what are my practical conclusions?

I believe that our colleagues are right to establish a distinction between the cases where we have to treat an otitis before the spontaneous rupture of the tympanum, and those where the drum is already perforated when we are called to the patient. In the first, nothing is more natural than to try to protect the middle ear from the extra-auricular germs which it has till now, escaped. If the drum is incised aseptically, by a skilful hand, and the discharge is small, I will gladly admit that the method of treatment recommended by my colleagues would be the most opportune, and that a loose piece of hydrophile, aseptic gauze introduced daily to the margin of the perforations is the simplest and best method of treatment.

The hydrophile power of the drain is sufficient to draw off the little pus which collects in the middle ear in 24 hours, and it can thus be kept free from all new infection.

But whether or not, the drum opened spontaneously before the specialist come on the scene, do you really believe, gentlemen, that the same method of treatment is applicable to those profuse discharges which in the space of less than an hour impregnate many large pieces of gauze?

I confess that I do not share the feeling of discredit expressed by our colleagues in regard to injections into the meatus. They present three objections.

(1) They are useless, since the drain introduced into the meatus serves to remove the pus. But my answer is, that this is precisely what is not done, as its absorbing power is soon destroyed by the abundance and consistency of the pus.

(2) They are hard to make aseptic, and consequently are usually infectious. I don't see that it is difficult to make people use only boiled water, which is not infectious.

(3) They are irritating and cause cicatrization by the shock which they produce at the margin of the drum. It

seems to me sufficient to overcome these inconveniences by having the lavage made gently. Our colleagues add that nowhere today do the surgeons wash fields of suppuration or irrigate abscesses with good openings. I answer, that here we have an abscess that is insufficiently opened, since we have only the tympanic perforation, which cannot suffice, and which has a tendency to shrink or become obstructed. We have, in short, a very special case in a peculiar region, and our colleagues are wrong to wish to apply the principles of abdominal surgery in their entirety. I find that the injections used without force in the meatus are admirably adapted to the peculiarities and difficulties inherent in the region in question, the liquid injected penetrating the tympanic perforation, which their pieces of gauze cannot pass, as far as the middle ear, thus aiding in keeping the perforation open, and when it has reached the middle ear, mixing with the pus it finds there and making it a fluid more capable of elimination. My personal experience is entirely in accord with the above theoretic considerations.

As I said above, in a case of otitis media acuta with profuse discharge, after I have seen that a piece of gauze will be insufficient to drain the amount of pus produced by the ear in 24 hours, I confide either to the physician in charge or a member of the family of the patient the task of irrigating the ear, by means of a little metal syringe, with warm water, previously boiled, to which a quart of oxygenated water has been added in the proportion of 1 to 12. After each lavage the patient performs the Valsalva method, so as to keep the perforation permeable, and then several drops of carbol-glycerine—1 to 15 or 30—are dropped into the meatus. After this, a piece of gauze, sterilized and cut in advance by the physician, is introduced into the meatus, but not pushed deep into it, and the person making the lavage must renew this whenever the piece is saturated with pus.

My part in this condition is only that of supervision. That is to say, I see the patient every 3 or 4 days, except when the doctor or the person in charge discovers fever or tenderness on pressing the mastoid. The douches are naturally lessened in number according as the discharge decreases in amount, and I announce when the treatment must be modified, for example by substituting for the carbol-glycerin insufflations of powdered boric acid, and when air must be forced through the Eustachian tubes to remedy insufficiency of audition.

I desire to say, that since I have adopted this method, it does not seem to me that my patients have required more time to be cured, than when I used pieces of hydrophile gauze renewed every 24 hours. I believe that the opposite is true, and I have come to the conclusion that in cases of acute suppurations of the middle ear, with profuse discharge, it is better for the patient to have numerous lavages by nonsurgical hands than a daily tampon by a specialist. It is well to see things as they are in reality, and how they consequently appear to the large medical public. When, for example, doctors claim, as they have been accused, that as a rule the acute suppurations of the middle ear get well of themselves, and that we see only the severe forms, they are not so much at fault as you seem to believe. And you will not remove the feeling that to use in every otitis suppurativa acuta the treatment, minutely carried out by the specialists as described by you, is nothing less than an exaggeration.

For you, the complications and sequelae are dependent on the manner in which the otitis has been treated; I believe, on the contrary, that after the paracentesis, whose therapeutic value I appreciate no less than you, the different methods of treatment adopted for an acute otitis has little influence on its course. I use intentionally the word acute, for on the other hand, I consider our action as all-powerful in chronic otorrhea, when we are able to reach the middle ear directly either the meatus through the large defect in the drum, or as a result of an operation, when the lesion has extended to the antrum.

Where, then, is the origin of the special gravity shown in certain acute suppurative otitides, whether at once (meningitis, etc.), or later chronicity, loss of hearing, intracranial complications)?

I think I am in accord with the results of our daily observations when I say that the complications of the first kind (let us call them immediate complications) appear at a time close to the beginning of the disease, after the drum has been opened by us, and the patient has been regularly treated by us according to the most rigorus antisepsis. The treatment adopted should not be held responsible, and their occurrence can be explained only by a virulence and special diffusibility of the infectious matter, or by an anatomic peculiarity, especially exposing the subject either to the passage of the infection into the endocranium, or in the case of Bezold's abscess, to the rupture of the inferior wall of the mastoid.

As to the later sequelae of otitis, it seems from my observations, that it is no less a mistake to ascribe them to the method by which the otitis was treated in its acute stage. If we question our patients who have chronic otorrheas accompanied by extended destruction, not only of the drum but also of the chain of ossicles, and the osseous walls of the middle ear, lesions which result in diminution of hearing, and which expose the patient, by the fact of progressive ulceration of the bony walls, to infection of the lateral sinus of the brain; if we question them, I say, we will almost always find that their otorrhea, which often dates back to their infancy, appeared during the course of one of those general infectious diseases (scarletina, diphtheria, measles, typhoid fever....) which have the sad privilege, from the very beginning, of attacking the auditory apparatus, and of producing there wide spread and irreparable destruction, no matter what energy and ability was used in treating them.

Consequently, here again, an attentive and unprejudiced observation of the part played by us, leads to the conclusion, that the treatment instituted by us could be only impotent.

I cannot deny, that in this debate, I have taken an ungrateful part, my arguments tending to nothing less than to contest the value of our means of action against acute uncomplicated suppurations of the middle ear. But I regarded it my duty to combat what seems to me an illusion, and I once more repeat that I do not believe there is one of us who thinks that we are able to act with any efficacy on a purulent focus, from which we are separated by a membrane pierced by a small hole.

It is, fortunately, consoling to think that if we are condemned, as long as the otitis remains uncomplicated, to the simple observation, we have a brilliant revenge for this powerless and passive role as soon as complications appear, which result from insufficient drainage of the middle ear, since we are authorized to open a passage way directly to it and, are furnished, so to say, with the occasion of becoming its master, and in the future directing efficaciously the evolution of the disease.

VACHER (Orleans)—I do not think that it would always be possible to find among our patients a sufficient understanding in the family of the patient to allow them to be entrusted with carrying out the douches; therefore I am very careful in the prescription of irrigation.

There is a very interesting point, on which I should be glad to have the opinion of my colleagues. What line of conduct should be followed in cases of otitis acuta which cease to be acute, without becoming chronic? What should be done at the end of 2 to 3 weeks with a discharge which does not cease, and yet in which there are no indications for antrotomy?

This my method of action. With a fine Hartmann's canula and a Pravaz syringe, I inject into the middle ear a solution of sterilized cocain, prepared on the spot. I leave this 5 to 10 minutes, and then irrigate with a large amount of ordinary solution. I repeat the lavage every day or every other day, and usually obtain good results. If this does not suffice, I use picric acid (1-200 or 1-300). Its cornefying power seems to me to exert a favorable action, and I obtain thereby very rapid cures.

Molinie divides acute otitides into 3 forms; otitis catarrhalis, otitis suppurativa, otitis with mastoiditis.

There are three factors in determining the gravity of the disease; the receptivity of the subject, the virulence of the pathogenic agent, the anatomic conformation.

The last, considering the mastoid complications, has a considerable importance, for we know, for example, if the cellular system of the mastoid is reduced to a small antrum, there will be no mastoiditis. In the catarrhal form, warm fomentations are advisable; in the suppurative form, paracentesis. After paracentesis, drainage with gauze, as described in the report is theoretically perfect; practically it is insufficient and confining.

We shall not abandon injections, which can be made aseptic, even when used. by the family. It is sufficient to have the patient buy a metal douche, which should be boiled each time before irrigating. As to the rational and surgical therapy of otitis media, there is only one, antrotomy. Most of the otitides mediae get well of course, without antrotomy; but there is nevertheless a fixed indication for this operation, viz., when the duration of the discharge has exceeded two months, even without mastoid symptoms.

In conclusion, M. thought that the otitides of tuberculosis and diabetes should be described as special forms.

Dundas Grant found that injections have been condemned too completely by the committee. The cases must be distinguished from each other. The dry treatment is used by him in a hospital of children; what was described in the report was the ideal treatment. But the treatment cannot be applied to out-patients, and it is necessary to have recourse to irrigations; and the result is not so deplorable.

HIRSCHFELD recommended the use of sodium sulphate (2%), which has the property of dissolving the albuminoids and which is very good in lavage; on adding to it a solution of mercuric iodide (3%) we have a perfectly handy antiseptic solution. A pupil of Lister, he was a partisan of antisepsis, too much scorned by asepsis.

There is need of antisepsis after a paracentesis. Before it, as Lermoyez says, it is good to make preparatory instillations of carbol-glycerin in the meatus; but it is good, just before the operation, to cleanse the canal with alcohol. He concluded by insisting on the great utility of the paracentesis when indicated. We never regret making it, but sometimes regret terribly not having made it. The indication seems to him more pressing in old people.

Finally, Grant showed a small bottle with an opening to admit a tube, for a nasal douche. The utility of the nasal douche is very great in the treatment of otitis.

CHAVASSE (Paris). I share the belief of the committee in regard to paracentesis; performed at the proper time, it prevents complications, except in grip otitis, nevertheless they do not always develop where it is not performed.

I share, furthermore, the committee's belief as to the treatment following the paracentesis, and I am a partisan of drainage by pieces of gauze. To make this as perfect as possible, I change the piece two or three times a day. I recognize, however, that this treatment, perfect for the hospital, presents inconveniences among our patients. So when I cannot have recourse to it, in order to avoid the irrigations, which are usually badly made and malapropos, I use baths of oxygenated water followed by instillations of 5% carbol-glycerin.

BROCKAERT (Ghent). I do not share the ideas of the Germans and of some of my colleagues who think that antrotomy should be performed in every case of acute otitis media which has resisted rational treatment longer than two months.

In 100 cases of acute otitis taken from a free clinic, that is to say, where the conditions are far from being perfect, I have had only 2 cases of mastoiditis, one of which was cured by ice applications, and the other by trepanation, and among these 100 cases, 15 were cured only at the end of 3 months or more.

GLAOUE (Bordeaux). The committee are not partisans of tubal douches; for my part, I use them with success. When there is a large opening in the drum, and the mastoid has commenced to react, the lavages are beneficial, being able to remove the pus in the antrum and avert trepanation.

NOQUET (Lille.) I, also, am a partisan of lavage per tubam. Following the example of Delstanche, I make injections of europhenated oil of vaseline. I have adopted europhen in preference to iodoform on account of the disagreeable smell of the latter.

Injections per tubam have given me excellent results at the end of 15 days on an average.

HENNEBERT (Brussels). I have seen Delstanche use injections of iodoform-vaseline oil per tubam from the beginning of the otitis; in the great majority of cases, the acute signs have disappeared, and the inflammation was cured without perforation of the drum.

MAHU (Paris), showed a paracentesis needle.. The handle contains a reservoir of chloroform in which the needle is immersed. This method reproduces in a less cumbersome manner the needle-case of Lermoyez, for the conservation and disinfection of paracentesis needles.

CASTEX is a partisan of injection in the treatment of acute otitis. He believes that antiseptic fluids injected into the canal enter the middle ear by capillarity.

LERMOYEZ. In the beginning, I beg all of you, particularly my friend Luc, to forgive me, if, in what I am going to say, my words seem to go faster than my thoughts. But if I was prepared to reply to the different otologic objections which could have been made at the conclusion of our report, I was far from expecting, I assure you, to be compelled to defend before this tribunal, the fundamental principles of general surgery, which, elsewhere, are universally admitted. And while my opponents were speaking, I thought how fortunate it was, in maintaining the good renown of otology in the medical public, that we are in a family circle, and that no indiscreet ear of a surgeon or bacteriologist is able to hear us. It is the value of asepsis, it is the technique of drainage which has been doubted . . . . !!!; truly I am overwhelmed. What! is otology going to stop at the point where it wishes to hold itself apart from the medico-surgical movement, and ignore its laws! Ah, do not fear that you are going to draw on yourself the pleasant joking with which I have just threatened you. No, it is the disrepute from which it has been so difficult to free the word specialist.

Some one has said that he did understand how a piece of gauze when saturated was able to drain pus; the most primary manual of minor surgery says that; it is not my place to explain it.

Luc likes lavage of the ear; that is a question of taste. Many others also, of whom I am one, have liked them, who afterwards did not. But in our report we have shown, at length, their inconveniences, and it is not necessary to revert to them. where our colleague is laboring under an illusion, and which we truly cannot leave to him, is when he persuades himself that the fluid injected into the meatus penetrates into the middle ear and washes the parts. But what then becomes of the membrane pierced by a small opening, which according to him, puts such a separation between otologic customs and the surgical code.

I know that for many years Luc has cherished a dream, which is dear to him. It is to assist at the triumph of antrotomy as a systematic treatment of otitis media suppurativa acuta. And though he defends himself faintly, nevertheless he seems to me to be conspiring as best he can for the advent of this new regime. In that, he holds faith with himself; for it is not surprising that he should be lead to that conception by the consideration of the acute ototides which he has treated by home-made lavages. Perhaps the strong desire to bring about this antrotomic revolution has made him the advocate of the cause which he has just plead before you with so much eloquence. That is not his desiree did he say? Nevertheless his insistence lends weight to this thought.

As for the rest, the facts speak for themselves, and they assert the superiority of the modern treatment of otitis purulenta acuta. Let us not fall again into the errors of the ancient physicians who preferred discussing to proving. Let us apply in a non-partisan spirit, the rational treatment indicated in our report for a sufficiently long time, and in a few years, when we have our statistics, we will be able to draw serious conclusion. As the matter stands, there is no place for brilliant dissertations, nor room for discussion of facts. Personally, I assert that for 3 years I have abandoned the old treatment of acute otitis whose foundation was air douches and injection of lukewarm water, and therefore must turn state's evidence, must forswear my old religion, which Luc at this moment follows, and declare that I now cure my patients oftener and quicker, and I am convinced that antrotomy, as a weapon against acute otitis, will become more and more rare.

A couple of words more. In our report, we wished to address ourselves to the general practitioner, whom we hope to reach, as well as to the aurists who hear us.

To the doctors who will accuse us of prolonging the otitis by an excess of local treatment, we desire to state that the abstaining which they propose often leads their patients to deafness and even death, and that we, who treat their ears, save their hearing and their lives. To the aurists we desire to prove that the better in otology is often the enemy of the good, and that the desire to do too much for the sick ear sometimes retards the cure. It is better to do well than too much; and to do well is, as in all surgery of pus, to give large and especially proper drainage.

Luc. I can find nothing more worthy of praise than the efforts of Lermoyez to apply to the ears the great principles of general surgery.

But then, if he wishes to be consistent, there is no other resource, when he has a suppurating ear, than to open the antrum, so as to have a real drainage, that is to say, a perfect drainage of the middle ear. Whenever this operation is not performed, the case of the ear is a special one, and consequently demands special treatment. I demand that you show me a single example in general surgery where the surgeon has to drain a focus, from which he is separated by a membrane pierced by a small opening. As an aid to his theory of drainage by gauze, Lermoyez recalls the experience of draining a bowl of boullion by means of piece of gauze introduced into its contents, but this simile is fundamentally erroneous. In a case of otitis acuta, the gauze stops at the margin of the perforation; then we must consider the consistence of the pus, which instead of being a saline solution, like bouillon, is a thick fluid, carrying solid elements. Since we are talking kitchen, I consider it justice to compare it to a *sauce blanche*, and it is with a saucer full of this fluid that I suggest Lermoyez should renew the experiment with which he has just enlightened us. I will wager that he will not get more than a spoonful.

Lermoyez: I am glad to see that at least Luc has accepted the subordination of the treatment of otitis acuta to the rules of general surgery. Only we do not understand it in the same way. For me, it consists above all in a proper state; for him it seems to center in antrotomy, which he likes so much. Now one is able to be in proper state without necessarily being trepanned.

Nevertheless, I humbly admit that the culinary arguments brought against me finds me with no reply. The brilliant charge of the cook against the surgeon disarms me. In this matter my ability fails me, and I have nothing more to say. What consoles me is that Chassaignac himself, when he discovered drainage of suppurating cavities, was not able to foresee all the benefits to be reaped by the study of *sauce Hollandaise.*

MOURE: Whenever a report is made on questions of therapeutics, the subject must be treated in general, without regard to special cases. So, as Lermoyez has said, the committee have described the surgical treatment of the ear as a chapter of general surgery.

Moure replied to some questions in detail.

Injections per tubam are impossible in children; the otitides of children are more frequent, it is necessary to indicate a treatment applicable to them.

It is especially about the injections by the meatus that the discussers have shown the conclusions of the report. It is evident that one cannot remain always near the patient, that one is obliged to turn the treatment over to unskilled hands, and that then the injections are obligatory, but they are not the ideal method, but a *pis aller.*

When the antrotomy is indicated, it should be made.

Finally, let us remember that whatever the method of treatment may be, the termination of the treatment will depend in part on the ear itself and the cause of disease.

LUBET-BARBON thanked the numerous members who discussed the report and thus had become partial collaborators.

The desire of the report was not to dictate to the specialists their line of conduct. Otitides are numerous, and just as numerous are those which the members of the Society have cured with different techniques, but the report is addressed more to doctors who are not aural specialists. It is a kind of otiatric course of instruction.

We are all in accord on the important points; the conduct before perforation, the urgency of paracentesis when indicated, the necessity for free evacuation of pus after perforation.

When this discharge of pus is established, our technique differs in detail, but that is of little importance.

We are again in accord on the indications for antrotomy, and in ascertaining its urgency when indicated.

To sum up, make the paracentesis when indicated, watch the drainage, look out for indications for antrotomy and perform it as soon as it is indicated.

Transhyoidal Pharyngotomy for a Large Lipoma of the Epiglottis.

George Laurens (Paris). From the operative point of view there are two procedures, the subhyoidal path and the transhyoidal path that give access to the middle of the pharynx.

From the standpoint of indications, it is necessary to distinguish two cases.

(1) An operation should be made on the epiglottis and the pre-epiglottal region for the extirpation of a tumor of every limited appearance; fibroma, cysts, lipoma. In such cases the transhyoidal will give an excellent vertical approach.

(2) The intervention is for the purpose of reaching the aerial enclosure—aryepiglottic folds, apex of the arytenoids—or the inferior pharynx. Then subhyoidal pharyngotomy is indicated. The path thus given is horizontal and perfect.

The choice of methods is determined by the region to be operated, and the localization of the tumor.

It was on account of a benign neoplasm in the paraepiglottis that I was called to operate last October.

The patient, Mme. de V., was sent to me by Dr. Chevalier, of Maus, for a tumor of the laryngeal opening.

For several years the patient had difficulty in swallowing. Not much, it is true, but constant. She was treated for pharyngitis and nervousness; sent to numerous thermal resorts; had undergone the most improbable medical treatments, but a laryngoscopic examination had never been made and the affection had finally reacted on the general health. Thin, hopeless, without appetite, pale and yellow, such was the condition presented by the patient at the end of September.

She had been led to consult Dr. Chevalier for two attacks of nocturnal dyspnea, and frequent, recent dysphagia. She was afraid she would die in an attack.

Examination showed dyspnea, the voice was not hoarse but roughened. It seemed that there was a tonsil or a endopharyngeal foreign body.

Palpation of the neck revealed a tumefaction of the subhyoidal region; the outlines of which were difficult to determine, but without the least change in the skin. Complete absence of adenopathy.

With the laryngoscopic mirror I saw a large, rough tumor, lying between the base of the tongue and the pharynx, occupying the entire space between these two organs. No passage for air or food. Impossible to distinguish the slightest trace of the epiglottis or folds; the valleculae were occupied by this huge mass. To the naked eye the tumor was covered by a smooth, regular, thin, whitish-yellow mucosa.

I immediately made the diagnosis of a benign pre-epiglottic tumor, without being certain of its nature; cyst, fibroma or lipoma. I took the standpoint of immediate operation, without making any attempt at extraction through the mouth, and I advised opening of the pharynx, which was accepted.

The operation took place next day at my clinic.

The beginning of the intervention was very dramatic, and but for an alert chloroformer would have been very grave, for I had to stop the anesthetic three times and make artificial respiration.

Three times the patient became cyanotic, pupils dilated, and I had to use all the methods practiced in such cases to resuscitate her.

These terrifying anesthetic circumstances were due to the obliteration of the superior orifice of the larynx by the tumor, and neither projection of the maxilla nor traction on the tongue could furnish a permanent air passage.

I immediately made a tracheotomy, and it was only after an artificial respiration had been sufficiently prolonged that I commenced the operation in all security. I could have done the operation under cocain, but the patient was very much frightened and demanded general anesthesia, and it was hard for me to determine in a state of wakefulness the difficulties that I would encounter in the state of sleep.

Without describing the transhyoidal operation, I will recall the interesting details and their sequelae in this particular case.

The operation was very simple, and after I had cut the mucosa of the pharynx I came upon an enormous lipoma which had attained almost the volume of the fist, which had developed in the vallecular region, pressing the tongue forward and the epiglottis backward. The pouch adhered to the whole anterior face of the laryngeal operculum and the neighboring region. After I had stripped off its capsule, and enucleated the tumor, I closed the pharynx by several sutures, and joined the two segments of the hyoid bone by a row of periosteal stitches.

The sequelae of the operations included an interesting incident. A secondary necrosis of the hyoid bone which gave considerable secretion, forced me to reopen the wound, and make a hyoidectomy to reach the purulent focus. From that time cicatrization progressed very quickly.

I saw the patient recently, and I was struck by two facts: (1) Complete absence of deformity of the larynx, and of trouble in phonation, in spite of the absence of the bony framework and hyoidal musculature.

(2) The great improvement of the general health, which for ten years had never been right, probably due to a better respiration and oxygenation.

Laryngotomy.—Technical Details.

Castex (Paris) showed some points of technique derived from a certain number of laryngotomies for epitheliomata and tuberculosis.

In two cases he tried to avoid using the canula in trachetomy, for he blames it for interfering with the operator by expelling the blood and mucous which are in the tracheal mucous membrane, and of being a source of infection.

He usually performed vertical, median laryngotomy under chloroform and without preliminary tracheotomy. Section of the thyroid cartilage and of the two thyro-hyoids and thyrocricoid membranes furnishes sufficient access to the larynx.

When the two valves of the thyroids are held by two retractors, it is necessary to wait a moment until the patient clears his throat. Then one proceeds to the ablation of the lesion with the thermo or galvanocautery.

At the time of the operation the head is put in the Rose position, so that the saliva cannot flow over the field of the operator.

Castex avoids denuding the valves of the thyroid with the two-fold purpose of preserving them from fracture during the operation, leaving them doubled, and of utilizing their tissue as an envelope to receive the cat gut which draws together the two halves of the cartilage.

For the first 24 hours only the patient remains in bed without a pillow, so that saliva cannot pass into the larynx.

Castex recognizes that in certain cases the canula is indispensable, or that one may have to use it some hours after the operation, but on comparing the results obtained by him according to the two methods, he finds that it is desirable to do away with the canula in laryngotomies, and that it is feasible.

MOURE is a partisan of preliminary tracheotomy to prevent the entrance of blood into the air passages, and for the greater convenience of the anesthetizer.

Foreign Body in the Nasal Fossae by Explosion of Gun.

TEXIER (Nantes). It was a case of foreign body, unknown to the patient, and which manifested itself only by a suborbital fistula, and a scanty muco-purulent discharge from the nose. The history given by the patient in regard to the suborbital fistula was not clear. It had existed only ten months, and resulted from an abscess of the cheek following a trauma (branch of a tree struck cheek); before this accident nothing wrong with nose.

No previous disease. Left arm amputated, following explosion of a gun. The examination of the patient showed at the orbital border a fistula running from the nose inwards and backwards for 12 cent. Examination of each nasal fossa revealed a blackish appearance in the superior portion. The probe demonstrated the presence of a hard, immovable body; perforation of the septum at this level.

Nothing found by posterior rhinoscopy, frontal sinus healthy; left maxillary sinus a little dark. The case was one of a foreign body bestriding the septum and lying in both of the nasal fossae

Next day we tried, after cocaining, to make it pass from one fossa to the other; it was absolutely impossible to move it in this sense. Transversely, on the contrary, it could be moved. By this manoeuver we found at the edge of the suborbital fistula, a little blood and a dark mass, hard to the probe.

We grasped, not without difficulty, this hard portion, and drew out a foreign body of the length and size of the little finger. On examination this proved to be metallic, crooked mass. It was simply a piece of the barrel of the gun. The accident, two years before, had put it there, and the compound fracture of the arm, which necessitated amputation, had alone received attention. They had paid no attention to the little wound in the cheek, which had bled very little, and rapidly cicatricized.

Investigations on Audition.

Castex and Lajaunie reported the results of a new series of investigations which they had made in the field of audition, in an attempt to make a control on those published last year.

For the two voices, loud and whisper, the sense of audition is exactly the same for both right and left ears.

This sense varies greatly even in subjects with normal ears. It seems to be increased in rainy seasons, and in large places. Thus the loud voice heard at 50 meters and whisper at 20 meters in the Bois de Boulogne, are heard at only 30 meters and 15 meters within the four walls of a certain garden in Paris.

It is in the transverse direction, to the right or letf, that one hears the best. Audition is a little better when the voice comes from behind than in front. This small difference, a meter at least, can be explained by the direction of the external auditory canal, which is directed a little backwards. A woman of 50 years, with a bilateral tympano-labyrinthine sclerosis, and very deaf, came lately to Castex's clinic. She was asked to place herself close to the interlocuter, in the attitude most favorable for her to hear. She always placed herself with her back three-fourths turned so that the mouth of the person speaking was facing the posterior border of the mastoid.

The different measurements taken by Castex and Lajaunie have been depicted in an auditory field of the ears. This tracing, for the same person, is composed of two ellipsoidal curves, partially coinciding. The curve is elongated toward the right and the left. It would be interesting to note the changes in the tracing in otosclerotics and hysterics.

The Use of Natural Sulphur Vapors in the Treatment of the Chronic Affections of the Middle Ear.

Lajaunie (Aix-les-Thermes) first explained how the sulphur vapors are spontaneously produced, by the hot sulphurated waters, and how they vary in their composition according to the quality of the waters that produce them. But whatever be their origin, all natural gases are complex, so they can be regarded as a mixture of gases.

With this in mind, the author then studied their constituents —chemical composition, thermality, hydrometric state.

He showed that to give a dose of the sulphur gas, it is necessary to be able to know the dosage of each element in it.

These vapors are conducted into the middle ear by an Itard tube, but the manner of compression is not to be neglected, for it is necessary to be able to vary the pressure of the gases used.

Apropos of the temperature, Lajaunie showed that it was of great use to employ the gases at high temperatures, near their origin.

In summing up, thanks to the special circumstances claimed by the author, the middle state and length of application can be varied at will.

Indications—The author is not a partisan of this method of treatment in suppurative forms, as it can cause acute exacerbations. On the other hand, excellent results are obtained in the chronic, non-suppurative forms, in the old catarrhs, where insufflation of air and bougiring has not helped. This condition is the chief indication for this treatment. In sclerosis of the middle ear, there is frequent diminution of the tinnitus; often a slight improvement in audition, either by an action of the treatment on a chronic concommitant catarrh, or upon the sclerosis itself. At any rate, the progress of the affection is checked.

Total Laryngectomy; Presentation of Patient.

E. LOMBARD (Paris) in the name of M. Sebileau and himself presented a patient successfully operated on by total laryngectomy for cancer. The patient had been operated on less than two months previously and completely cured. He thought this favorable result could be attributed to certain details of the postoperative technique, which are not without importance.

(a) The patient is placed in a reclining position after the operation with his head low, and this position is maintained for about 10 days. This prevents the formidable infection of the cellular tissues of the neck, and is used by Sebileau in his work in all operations where the oral cavity is in extensive communication with the cellular tissue of the neck through the operated field.

(b) Dressing is daily.

(c) Immediately after the operation, the conic canula of Perier is replaced by an ordinary tracheotomy canula, whose external orifice, however, lies about 2 cent. beyond the edge of the skin. This canula allows as thick dressing as may be desired without fear of obstructing the tracheal orifice, and there is no infection of the line of sutures of the trachea to the sutures of the trachea to the skin by the trachael secretions.

Extraction by the Mouth, After Two and One-half Months' Sojourn, of a Foreign Body in the Esophagus of a Child Two and One-half Years Old.

G. Mahu (Paris). The case was one of a foreign body of a discoid shape, of heavy iron, 24 mm. in diameter (wheel of a locomotive, child's toy), held in the esophagus at the level of the first tracheal ring. Its position was determined by the radioscope, only at the end of two and one-half months, the mildness of the symptoms, for a certain time, and a resultless probing having convinced the parents and their doctor that no foreign body was there.

Esophogoscopy having been refused, the extraction was made under chloroform, with no accident, by the aid of a Kirmisson's hook, which seems to me the instrument of choice in this class of cases. The sequelae are very simple. There is no cicatricial contraction of the esophagus, and, after six months, the patient is in excellent health.

The author draws attention to the tolerance of the esophageal walls in this particular case of a discoid body, where it is a question, not as usually of a piece of copper money, but an iron object which probably produced only a slight inflammatory reaction, and no infection.

ABSTRACTS FROM CURRENT OTOLOGIC, RHINLOGIC AND LARYNGLOGIC LITERATURE.

I.— EAR.

Conservatism in Otology.

GORHAM BACON, New York, (*Medical News,* August 6, 1904) enters a plea for a little more conservatism in aural surgery, especially as regards the so-called radical operation for chronic purulent otitis media. He finds many such cases get well when treated along more conservative lines. In considering the advisability of operating on a patient suffering from chronic otorrhea of long standing, it should be determined first of all whether the perforation is sufficiently large for the purpose of drainage. If this opening is large and a probe passed into the attic finds but little carious bone, it is our duty first of all to try to cure the disease by means of injection through a middle-ear syringe. There is but little chance of the disease extending to the brain if the patient is properly treated. Solutions of bi-chloride 1-3000 followed by injections of boric acid in alcohol or iodoform in alcohol are used. Peroxide of hydrogen is never to be used in such a perforation. Exuberant granulations are to be removed and everything done to establish good drainage. Should, however, the patient complain of frequent attacks of earache, and if on examination it is found that good drainage is impossible, the perforation very small, the ossicles carious, the discharge fetid and containing cholesteatomatous masses, and, moreover, if there is a carious condition of the attic, then an immediate operation should be advised. Especially so if there have been frequent attacks of mastoid inflammation as shown by sensitiveness over the process.

Dr. Bacon thinks that in operations on the mastoid process and in those for brain abscess and sinus thrombosis, there is at the present time a tendency to make too extensive incisions over the mastoid and in the neck, without regard to the subsequent disfigurement of the patient. If too much bone is removed from the mastoid there is liable to be considerable depression and the auricle does not return to its natural position afterward, especially if the incision is carried too far backward and curved over the auricle in the temporal region.

In the Schwartze-Stacke operation there is always a chance of injuring the facial nerve, and while the paralysis may be only temporary, there is a possibility of its being permanent. *Richards.*

Treatment of Acute Middle-Ear Disease.

JOHN A. DONOVAN, Butte, Montana. (*Medical News,* September 17, 1904.)

The Value of Early Incision of the Membrana Tympani in the Treatment of Acute Suppuration of the Middle Ear.

FRANCIS R. PACKARD, Philadelphia. (*Medical News,* September 17, 1904.) On the first symptoms of earache Donovan uses heat and dehydrating remedies, and if these do not produce beneficial results in a few hours, he then treats the case surgically by free incision through the entire drum extending into the upper canal wall if necessary, followed by aseptic gauze drainage and outside pad for absorption.

The treatment as given by Packard is essentially the same. After incision of the drum he mops out the canal with peroxide of hydrogen, followed when the discharge is very profuse by a few small syringefuls of bichloride of mercury 1-4000 solution, and then inserts a wick of iodoform gauze to be left in position twenty-four hours or as long as there is no evidence of its damming up the pus.

Both authors speak of the anesthetic effect of anilin oil and alcohol, the formula as given by Packard being five parts of a 10% solution of cocain combined with 50 parts of anilin oil and 50 parts of 5% alcohol. In two of Packard's cases, however, the patients' temperature became subnormal and they were deeply cyanosed, the blueness lasting for several days. (Inasmuch as dangerous results have been reported from this mixture, it seems to the reviewer that its use ought not to be recommended, since as good recovery takes place without its use as with it.)

Packard does not believe in the douching of the area by the patient or nurse since no one but a skilled aurist can properly dry the ear after such procedure, and the little pool of liquid left affords moisture for the furtherance of bacterial growth. *Richards.*

Report of Two Cases of Mastoiditis with Paralysis of Facial Nerve; Recovery of Paralysis Following Operation.

Seymour Oppenheimer, New York, (*Medical Record,* September 10, 1904). The first case had scarlet fever at ten years of age, followed by suppuration which had continued at intervals up to the age of twenty-seven. On rising one morning he found that there was facial paralysis of the left side. There was nothing abnormal in the mastoid except dull pain on deep pressure over the antrum. The external canal was filled with offensive pus. Operation was done. Considerable granulation tissue with necrotic tissue around the area of the antrum. Complete communication was established between the mastoid wound and antrum and tympanic cavity. The mastoid wound pursued the usual course and in four weeks the patients was discharged with the ear practically dry. The day following the operation there was marked alteration in the paralysis, and at the end of the second week it had entirely disappeared with the exception of the involvement of the chorda tympani nerve. In six weeks there was complete disappearance of the facial paralysis.

The second case had intermittent otorrhea following one year after typhoid fever, which continued more or less intermittent for six years. Four months previous to being seen there was difficulty in whistling, and examination showed facial paralysis involving the lower half of the left side. The mastoid was slightly swollen, painful, and the external canal filled with pus. He at first refused operation. Treatment through the external canal improved the drainage and relieved the pain but had no influence on the paralysis. Finally the patient allowed operation. The interior of the mastoid was extensively disorganized and the antrum and middle ear contained an unusual amount of granulation tissue, and on the posterior wall over the facial canal a sequestrum was removed which allowed the exposure of the facial nerve. The first two weeks after operation there was constant discharge. During the next period of four weeks he slowly improved and the remains of the facial paralysis entirely disappeared. In facial paralysis as the result of mastoiditis the prognosis for the restoration of the nerve function must be derived from an electrical study of the nerve. If the paresis is not well developed and the electrical irritability is normal, a favorable result can be expected a short time after the pressure has been relieved, and in those cases in which partial reactions of degeneration are present, the mastoid operation should be performed with the expectation of relief some weeks after. But in the class of cases with well-marked reactions of degeneration, the chances are against the restoration of nerve function, though the mastoid operation may be necessary independent of the hope of removing facial paralysis. It is always a matter of precaution to make the electrical tests in order to obtain an intelligent opinion of the probable results of the operation as regards facial paralysis. *Richards.*

Need of More Accurate Knowledge in the Diagnosis and Treatment of Chronic Suppurative Otitis Media.

James F. McCaw, Watertown, N. Y. (*Medical News,* August 27, 1904). Appropriate treatment of the middle ear will yield good results in a large percentage of cases. If caries is limited to the ossicular chain and there are no contra-indications ossiculectomy should be the operation of selection, while cases presenting symptoms of extension beyond the tympanic cavity should be subjected to the radical operation. *Richards.*

Affections of the Facial Nerve in Diseases of the Ear.

Zimmerman, Milwaukee, (*Archives of Otology* Vol. XXXIII., No. 4). In acute affections of the middle ear, if there be dehiscences of the walls of the facial canal, the nerve is exposed to direct pressure from the swollen mucous membrane or accumulated exudations. Or the inflammation may extend to the neurilemma with resulting perineuritis or by compression of the nerve by congestion of the periosteum or engorgement of the stylo-mastoid artery in the common canal.

Facial paralysis in tuberculous otitis media is eighteen times more frequent than in the simple form (Schwabach.) It is an ominous symptom as it is generally a forerunner of death.

The most frequent cause of facial paralysis is destruction of the Fallopian canal by caries and necrosis of the petrous bone, subsequent to chronic purulent otitis media.

Traumatism may produce facial paralysis either directly, or indirectly, by subsequent hemorrhages or suppuration.

A paralysis immediately following an operation is incurable unless a plastic union is made. Those paralyses occurring after one to a few days are caused by grazing the nerves with instruments, or pressure from blood or wound secretion, or too tight packing and are curable. Prognostic information on facial paralysis is obtained by electricity. If at the end of 10 days the irritability of the nerve is not below normal the face will probably be well in a few weeks. If on the other hand at the end of 2 weeks the irritability of the nerve is absolutely lost, the paralysis will certainly last for several months.

Incurable facial paralyses have been greatly improved by an anastamosis of the distal end of the facial with a branch of the spinal accessory or with the hypoglossal nerve.

Campbell.

Report of a Fatal Case of Latent Temporo-Sphenoidal Abscess of Otitic Origin, Followed by Multiple Secondary Cerebral Abscesses.

WAKEFIELD, New York. (*Archives of Otology*, Vol. XXXIII., No. 4). A girl, aged 11, who for the past 6 years has had occasionally a slight purulent discharge from the left ear, for the past year has suffered from attacks of headache, dizziness, nausea, vomiting and constipation, with gradual loss of flesh and strength. During a recent attack of right lobar pneumonia persistent severe frontal headache was particularly noted. The pneumonia symptoms disappeared, but her physical condition did not improve. Three days before coming under observation she had a violent chill, became cyanosed and complained of loud noises in her head. Temp. 105° F., respiration 26, pulse 96, and two days later she had a prolonged chill, following which, left ear discharge reappeared with tenderness over the mastoid.

Operation was undertaken, the antrum and aditus were cleared of granulations and the probe detected bare bone on the walls of the tympanum. On exposing the sinus, no pulsations were visible, the dura was thickened and covered by grayish granulations. Incision brought a free flow of blood which was controlled by pressure.

Temporary improvement was followed by recurring chills, high temperature, violent headache, increasing drowsiness, optic discs hazy with beginning dilitation of the pupils. In the absence of localizing symptoms it was determined to explore the left temporo-sphenoidal lobe. Firm adhesions were found between the dura and tegmen tympani and on opening forward and inward into the temporo-sphenoidal lobe about 2 drachms of thin disintegrated brain tissue escaped. The cavity was lightly packed with gauze and dressing applied. For two days improvement was noted, then she relapsed and although a large second abscess was drained left internal strabismus, left facial paralysis and right hemiplegia developed. She sank into coma and died on the tenth day in hospital.

On post-mortem examination the dura was congested, thickened and firmly adherent along either margin of the median fissure. At the base, the dura was normal except over the tegmen tympani, where the firm adhesions were evidently of long standing.

The left temporal lobe presented near the center of the second convolution an opening which led into a cavity 4 cm. from before backward and 2 cm. from below upward. At the upper and back part of the cavity an opening led into a second cavity 4.5 cm. in its antero-posterior diameter, and 3 cm. vertically.

The surface of the right temporo-sphenoidal lobe was partially collapsed and incision along its outer border allowed four ounces of thin green pus to escape from an abscess cavity 6 cm. horizontally by 2 cm. vertically; from the walls of this cavity a pyogenic membrane extended along the middle horn of the lateral ventricle into the body of the ventricle. At the under surface of the cerebellum a subpial accumulation of pus covered two-thirds of the under surface of the right hemisphere and extended across the medulla, including one-half of the under surface of the left hemisphere. Bacterial examination of the pus showed an almost pure culture of bacillus pyocyaneus.

The history of the case emphasizes the fact that cerebral abscess may develop insidiously and remain quiescent until some acute illness or violent physical exertion renders the latent process manifest.

Localizing symptoms may be absent unless the abscess itself or the surrounding encephalitis encroaches upon cortical areas whose functions are definitely known.

Chronic suppurative otitis media attended with persistent localized headache and occasional attacks of dizziness, nausea and vomiting, and with progressive loss of flesh and strength, should in the absence of tuberculosis or other malignant disease, suggest the possibility of latent cerebral abscess.

Campbell.

Report of a Fatal Case of Brain Abscess of Otitic Origin.

Bacon, New York. (*Archives of Otology*, Vol. XXXIII, No. 4). Sixteen months before coming under observation the patient suffered from right mastoiditis, following an acute suppurative otitis media, for which a simple mastoid operation was performed. One year later there was recurrence and a radical operation (Schwartze-Stacke) exposed the dura and a probe could be passed to the temporo-sphenoidal lobe, but no pus was found. The posterior wound healed while discharge from the canal has persisted with more or less continuous headache. Eye examination showed a double optic neuritis with hemorrhages. Temp. 102.5° F., pulse 80. Somnolence with frequent moaning. A diagnosis of abscess in the temporo-sphenoidal lobe was made.

On operation, the dura above and behind the antrum, was found covered by granulations. The sinus was bared and found healthy. Over the temporo-sphenoidal lobe, as the dura was found tense in the most dependent portion, a scalpel was passed upwards and forwards, when from 2 to 3 ounces of thick, yellow pus were evacuated. Temperature next day 99.4° F. Mental condition improved. This improvement lasted a few days then he steadily grew worse. Further exploration revealed pus farther forward in the temporo-sphenoidal lobe. Post-mortem examination revealed the fact that the abscess had broken into the right lateral ventricle. Smears from the abscess cavity showed a mixed infection of streptococcus, staphylococcus and a thick short bacillus.

Campbell.

Remarks on a Double Cerebellar Abscess, Operation and Recovery.

EAGLETON, Newark, N. J. (*Archives of Otology*, Vol. XXXIII., No. 4). As Röpke has claimed that many successfully reported cases of operation for brain abscess have subsequently terminated fatally, the author has withheld this publication for nearly 2 years. All symptoms present before the first operation were either those of increased intracranial pressure or of irritation, there being no paralysis whatsoever. During the development of the second abscess, a distinct paralysis of the hand and arm of the same side appeared.

The rational method of drainage is through the occipital bone by means of a large opening, and at a subsequent operation one removes the source of infection from the temporal and at the same time opens into the abscess cavity from the front, if better drainage can be secured thereby.

When the exploring instrument has located the abscess, retain it in place till the cavity has been evacuated and the drainage material introduced, otherwise by collapse of the brain tissue the cavity may not be found again. With free drainage hernia cerebri and optic neuritis should rapidly disappear and their continuance demonstrates that the cause within the cranium has not been entirely removed. *Campbell.*

Sub-Dural Abscess of Otitic Origin, Opening Spontaneously Through the Parietal Bone.

Chavasse (*Arch. Inter. de Laryng.*, Sept., 1904). A man aged 23, presented April 13, a fluctuating tumor over the temporal bone extending from the zygoma to the mastoid. Ear fundus normal; history of earache associated with sore throat three months before, which disappeared in eight days without discharge. Abscess was opened revealing a fistulae down to mastoid antrum, which was then laid bare and curetted of its granulations. Four months later as fistulae had not healed, a second curetting and exploration was practiced. No diseased bone discovered. Fever now developed with melancholy and continual pain above and behind the mastoid process suggesting the beginning of a subdural abscess. October 29th, the radical operation was performed revealing periantral cells full of granulations but no fistulae to the cranial cavity. Distinct retinal changes appeared now in the eye fundus and everything pointed to a meningeal irritation. High fever and edema of the tempero-parietal region soon were present over the parietal bone. A zone of infiltration, the size of a two franc piece with fluctuations, was noted on Nevember 12th. This was opened, evacuating a half dram of pus. The probe demonstrated a minute fistula through the bone. Recovery was slow but uninterrupted.

The writer calls attention to a discussion of the subject by Taubert (Archives Intern. de Laryngologie, Sept.-Oct., 1900), who has shown that the development of such abscesses without lesions of the middle ear or without a suppurative lesion is well recognized.

He believes the transmission of the infection was along the epidural path. *Harris.*

Fibroma of Mastoid, Auricle and Auditory Canal.

Thomas R. Pooley (*New York Med. Jour. and Phila. Med. Jour.*, Dec. 17, 1904). A man aged 29, thirteen years before had a growth removed from behind his ear and from the auditory canal. Five months ago it recurred. Tumor as seen on admission to hospital was an elastic growth of the size of a pigeon's egg attached to auricle posteriorly. Another filled the meatus. Operation showed larger growth attracted the cartilaginous concha. After removal, wound closed with silk suture. Suppuration followed almost immediately, with return of the tumor in canal. This persisted in spite of all treatment until the X-rays were employed when improvement at once took place. This continued to full recovery. The pathologic report showed a fibroma. Pooley calls it, however, clinically a sarcoma or as Paget described them, "recurring fibroid tumors."

Harris.

Nomenclature of the Various Affections of the Mastoid.

Emil Amberg, Detroit, Mich., (*Detroit Medical Journal,* Nov., 1904), suggests the following nomenclature:

Mastoiditis acutissima for the cases which take a rapid course, clearly showing alarming local and general symptoms, especially of a toxemic character, and which do not respond to palliative measures.

Mastoiditis acuta for those which take a somewhat more protracted course, extending over a period of one or several weeks, exhibiting plain local symptoms, but which are not accompanied by intense pain nor by a grave affection of the whole system, which temporarily respond to palliative measures.

Mastoiditis subacuta for those which take a mild course.

Richards.

Report of an Anomalous Lateral Sinus. Report of a Case of Thrombosis of the Lateral Sinus.

Barton H. Potts, Philadelphia. (*American Journal of the Medical Sciences,* October, 1904). The patient died from cerebellar abscess twelve hours after operation. The sinus lay immediately below the external table and passed *through* the mastoid cells, being surrounded on all sides by pus, granulations and mastoid cells. It looked exactly like a large tube passing through the mastoid space. The horizontal portion crossed the mastoid space entirely, being separated from the external canal by a layer of bone not more than 3 mm. in thickness, and then made a sharp bend downwards and backwards.

The second case was a woman of 23, complaining of pain all over the head, tinnitus, vertigo, anorexia, with discharge from the right ear.

Purulent mastoiditis was diagnosed, free paracentesis and incision of the canal wall, hot douching, and dry heat externally, lessened the pain. On the fourth day there was a sharp rise in temperature, but without a chill. The temperature gradually subsided during the next thirty-six hours, when there was another sharp rise. Immediate operation was then done; usual mastoid first. The sigmoid sinus was found uncovered and contained a firm clot. The bone was removed in the direction of the jugular bulb and backward along the lateral sinus, the latter also being filled with clot. The jugular was then ligated 3 cm. below and 3 cm. above the facial, and entirely excised. The sinus wall was freely incised, and a curette passed down toward the jugular bulb and backward through the lateral sinus for 5 cm. until a free flow was obtained. This was at first an offensive reddish-brown fluid, and was allowed to continue until normal dark-blue blood appeared.

The neck wound was closed with interrupted sutures, and on the fifth day showed healing without first intention. Convalescence was without complications. *Richards.*

Fatal Case of Cerebellar Abscess.

JOHN H. ALLEN, Portland, Me., (*American Medicine*, January 7, 1905.) The patient was a boy of 16, suffering from acute otitis media with slight tenderness over the mastoid, for which the usual operation was done, and a considerable amount of pus was found beneath the cortex, all the carious cells being curetted out. There was improvement for 10 days except for a slow pulse. This, which had been between 75 and 90, dropped the third day after operation to 55. The temperature ranged a little above normal. There was drowsiness and hebetude for the next few days. On the fifteenth day after the operation he vomited in the morning, and in the afternoon the temperature went to 102, with pain and violent headache. There was leukocytosis of 15000. There were no sensory or motor pareses and no dizziness, no reduction in the high limits of hearing.

A second operation was done. The sinus was uncovered, found normal, the dura exposed, but as it appeared normal, was not punctured. A somnolent condition developed after this operation. Pulse, which was 100 in the morning, dropped to 55 in the afternoon the third day after the operation, and the condition of hebetude continued, followed later with a period of active delirium. Cheyne-Stokes respiration developed, and the patient being in a semicomatose condition, the third operation was done. The wound was reopened, the incision extended upward, making a flap over the squama. The dura was again exposed, incision over the tegmen, and a director passed inward, but no pus was found. Temperature continued to rise. Patient died with a temperature of 103 at 8 p. m. of the same day.

At the autopsy an abscess of the cerebellar was found with pneumococcus infection. The abscess was below the tentorium cerebelli, and about 30 cc. of light yellow, odorless pus was found. On section of the left cerebellar lobe an abscess cavity 4½ cm. in diameter was found, taking up a large part of it. This abscess cavity showed no pyogenic membrane, and was comparatively recent. Smears from the pus showed a lance-shaped diplococcus, with a definite capsule staining by the Gram eosin method. Many of the cocci showed degenerative changes.

In this case there were no localizing symptoms, the headache being variable in its location, there were no pareses or aphasia, and examination of the wound gave no indication of the site of the abscess. *Richards.*

Thrombosis of Lateral Sinus Following Acute Otitis Media.

M. V. Ball, Warren Pa., (*American Medicine*, September 17, 1904). The patient was a teacher of 28, who was taken sick April 18th with an exudative tonsillitis, which showed on culture streptococcus pyogenes albus. One week later there was pain in the left ear. Incision of the drum showed suppuration, and the pus on culture showed streptococci. The temperature which followed the next day was 104, with tenderness over the mastoid. Consultation. Consultant advised against operation. Following day swelling behind the auricle, severe chill, temperature 106. Mastoid opened. A few cells near the tip diseased; rest of the bone healthy. Temperature the following morning 98.2. Six p. m. had a chill; temperature 107. Day following, comfortable. Third day after operation, chill, temperature 104, sinus now explored. A few more cells filled with granular material; soft suppurative clot found filling the sinus; one dram of pus flowed out from below. Jugular not explored. Recovery from operation fairly good. Had temperature and chills next few days, temperature ranging from 99 to 105.

May 13, jugular explored and ligated. Jugular showed no signs of thrombus. From this time until May 21, when death occurred, the temperature took a continuously septic course. The ear, however, entirely ceased discharging. Antistreptococcic serum, 40 cc., and unguentum Crede were used without any appreciable effect. Pus from the lateral sinus showed the presence of streptococcus, showing that the process started at the tonsil. Blood cultures were sterile. The reporter thinks an early chill with a freely incised sympanum points to a thrombosis even though the mastoid be but slightly affected, and that after such a chill the region of the sinus ought to be explored. *Richards.*

A Case of Pulmonary Tuberculosis, with Interstitial Neuritis of Both Cochlear Nerves, Together with Persistent Embryonic Adhesions in the Scala Tympani.

Siebenmann, Basle (*Archives of Otology*, Vol. XXXIII., No. 5). The changes found were:

1. Slight cloudiness of both drums.
2. A non-perforative middle ear suppuration on the right.
3. Closure of the lower end of the scala tympani by bony connective-tissue and thickenning of the bony foot-plate of the stapes like a monstrosity of the right ear.
4. Interstitial neuritis of both cochlear nerves.

The consensus of investigations shows that sometimes a polyneuritic degeneration of the acoustic nerve comes about in a hematogenous way and appears simultaneously with extensive febrile tuberculous affection, which ends perniciously. The cochlear nerve, alone or the whole acoustic trunk may be affected. In these cases one may find either a simple degeneration or an interstitial inflammatory affection; in both cases, however, the primary seat of the disease is located in the retrolabyrinthine section of the acoustic nerve, as far as can be asserted from post-mortem results.

Only in rare cases, in which the patient survives the deafness for a long time, simple atrophic changes in the intra-labyrinthine section of the acoustic nerve develop in addition to this primary retro-labyrinthine disease of the trunk.

The clinical symptoms of the ear consist in decrease in hearing on both sides, which in rare cases comes on by degrees, but in most cases acutely and then leads in a short time (days or weeks) to complete deafness. Often, but not always, there exists subjective noises and when the vestibular nerve is affected, which is not frequent, the decrease in hearing is accompanied by violent vertigo. *Campbell.*

Otitic Brain Abscess.

Uchermann, Christiana. (*Archives of Otology,* Vol. XXXIII, No. 5.) The author reports eleven cases, three of which occurred in children; eight occurred in males and three in females; three occurred in acute and eight in chronic suppurative otitis. In nine the abscess was situated in the temporal lobe and two in the cerebellum.

Headache, either diffuse or localized, is the most constant symptom. It occurs principally in the occiput and frontal regions. The location of pain, usually, does not correspond to the seat of the abscess, although in hemicrania the abscess is nearly always situated on the painful side.

Vomiting usually occurs and is most pronounced in cases of cerebellar abscess.

An important sign is optic neuritis, but as a rule it is a later development, concomitant with slow pulse, which, likewise is due to pressure. Focal symptoms denote the involvement of finite areas of the brain. Muscular twitching is now generally looked upon as the result of meningeal inflammation. It usually occurs on the same side as the abscess, but frequently occurs on both sides.

The terminal stage is manifested by coma, with or without convulsions, and is most likely to end in paralysis of respiration. When it comes on suddenly it is due to rupture of the abscess into one of the lateral ventricles or the sub-arachnoid space.

Operative treatment should not await the development of local symptoms. In doubtful cases make an exploratory puncture and if an abscess is found drainage should be made as perfect as possible by splitting widely the wall of the cavity through the introduction of long, thin forceps with blades closed and their withdrawal with blades apart. After the cavity has been cleansed as thoroughly as possible a drainage with inner end and sides wrapped in iodoform gauze is inserted just within the cavity and then sutured to the skin flap. During the entire course of subsequent treatment the patient remains in the recumbent position. *Campbell.*

On the Operative Treatment of Otitic Intracranial Complications.

Denker, Erlangen. (*Archives of Otology,* Vol. XXXIII, No. 5.) Six cases are reported which followed acute and chronic purulent otitis and were all operated upon. It is well known that bacteria and toxins may pass to the endocranium by way of all the tympanic walls with the exception of the outer wall and by way of the bony surfaces of the mastoid, which border on the middle and posterior cranial fossæ.

The infection may travel along bony and vascular channels as well as through defects in bone, which are not infrequent in the roof and in the floor of the tympanum. The process may further lead to destruction of a window membrane or a part of the labyrinth wall and gain access to the posterior cranial fossa.

In addition to the more frequent otitic complications, we find rarely serous meningitis, a condition which has not as yet been demonstrated at autopsy, edema of the brain and cerebral embolus in otitic thrombosis of the carotid artery. The operations were undertaken on account of the following conditions:

1. Mastoiditis and perisinous abscess in acute otitis media.
2. Extradural abscess in middle cerebral fossa and fistula in external semicircular canal in chronic otitis media.
3. Temporo-sphenoidal abscess in chronic otitis medica sinistra.
4. Temporo-sphenoidal abscess, extradural abscess and subperiosteal abscess.
5. Pyemia in acute otitis media.
6. Multiple cerebral abscesses; basilar meningitis. In this case the only one to result fatally a large cerebral abscess was evacuated one month after the ear bgan to suppurate. Two more abscess were found post-mortem. The larger one of the two having broken into the arachnoid space. *Campbell.*

A Case of Thrombosis of the Jugular Bulb. Operation. Recovery.

Koller, New York. (*Archives of Otology.* Vol. XXXIII, No. 5.) This case presented the features of a primary phlebitis of the jugular bulb. After suffering for two weeks from an acute otitis media, the patient presented unmistakable signs of thrombophlebitis, high fever with chilly sensations, sensitiveness to pressure over the course of the sigmoid sinus and the upper course of the jugular in the neck. Papillitis rapidly developed and this Jansen claims is a common occurence in cases of primary phlebitis of the bulb. The mastoid was but slightly affected and there was no perisinous abscess.

As the first operation brought no relief, the sigmoid sinus was exposed in its entire length and found thrombosed. Upon curetting it bled freely from above, but not from the bulb region. The jugular vein, therefore, was ligated in the neck and 1½ inches dissected out. It was not thrombosed and a blood-culture was sterile. Symptoms persisted till the dressings were removed, then pus escaped from the lower part of the sinus groove. Later a swelling appeared in the neck below the occiput, which communicated with the intravenous abscess, as evidenced by the fact that pressure made over this swelling caused pus to ooze from the lower part of the sinus groove. When this and a peribulbar abscess were drained, recovery speedily ensued.

The left hypoglossal paralysis took some months to disappear, while the papillitis cleared up more speedily.

Campbell.

A Phonographic Acoumeter.

BRYANT, New York (*Archives of Otology,* Vol. XXXIII, No. 5). Its advantage is that the voice produced by the machine has a constant pitch and intensity, while the intensity can be varied from zero to the loudness of the voice when the speaking-tube is used. Simulated deafness can be detected through the use of the three-way valve by which the sound can be turned on or off in the individual ear, or by rapidly alternating. The patient becomes so distracted as to prevent replies consistent with any considerable degree of real deafness.

Campbell.

Earache, or Cases of Early Involvement of the Middle Ear, Usually Neglected.

FRANCIS P. EMERSON, Boston (*Boston Medical and Surgical Journal,* September 29, 1904), reports four cases of ear trouble due to small amounts of adenoids in children who did not show the typical adenoid facies, and in whom mouth breathing was not a prominent factor. Removal of the adenoids improved the general condition and stopped the earaches. He thinks that a child whose upper respiratory tract is normal rarely suffers from bronchitis or head colds.

Richards.

II.—NOSE AND NASO-PHARYNX.

Headache from Non-Suppurative Inflammation of the Accessory Sinuses of the Nose.

CHARLES M. ROBERTSON, Chicago (*Journal American*

Medical Association, March 5, 1904), thinks that many cases of headache are due to disturbances in air pressure in the frontal sinuses, and reports two such cases, the first of which was treated by an oculist without relief. Contraction of the middle turbinate so as to open up the natural passage to the antrum relieved the symptoms.

In the second case there were severe headaches, entirely relieved by removal of the anterior end of the middle turbinate. These cases were unaccompanied by any sign of suppurative inflammation of the sinuses. He thinks they are due to diminution of air pressure in the sinus, the middle turbinate being swollen so that the sinus cavity is cut off from the nasal chambers, following which the imprisoned air loses its oxygen, with the result that the pressure on the mucous membrane is lessened by rarefication of the air contained in the cavity.

Attention to the middle turbinate is imperative, as it is the key to the most important part of the nostril. *Richards.*

Adenoids in Infants.

HERMAN JARECKY, New York (*New York Medical Journal* and *Philadelphia Medical Journal,* August 13, 1904.) Jarecky reports five cases of adenoids in infants under three weeks, the age being respectively eight weeks, eight weeks, ten weeks, nine weeks, and eight days old. To meet the difficulty of operation on such young children he had an oval curette made, the cutting surface of which was six and a half by five and half mm. with a depth of 2 mm. set at an angle 120 degrees to the shaft, about 10 mm. above the bend. The shaft is slightly pliable and has a handle 20 cm. long. The patient was held in the arms of a nurse, and no anesthetic was used.

Richards.

Primary Nasal Diptheria. A Plea for its Early Recognition and a Report of Three Cases.

ANNA S. WILNER (*New York Med. Journal* and *Philadelphia Med. Jour.* Dec. 17, 1904.) The grave form of nasal diphtheria is emphasized in every text-book, bearing on the subject of diphtheria.

The mild form is entirely passed over. It usually occurs in children otherwise well and only suffering from a persistent nasal discharge. The disease may, however, spread and become dangerous. The chief peril, however, lies in the liability of infecting others. This is correspondingly greater than other forms because it is liable to be overlooked. Forty per cent. of all cases of diphtheria are complicated by the nasal form, while the Klebs-Loeffler bacillus is the invariable cause. All the infectious diseases serve as contributing causes, rendering a non-virulent bacillus pathogenic. In like manner a blow upon the nose, the use of the galvano-cautery in the nose may produce a like result. A persistent watery discharge excoriating the upper lip, with a grayish white membrane in the nose are the characteristic symptoms. Constitutional symptoms are usually absent. Wilner discusses the reason for the absence of the general infection and adopts Holt's theory, viz.: The poor absorbing qualities of the exterior mucous membrane of the nose. She is inclined to regard every case of fibrinous rhinitis showing Klebs-Loeffler bacillus as diphtheria regardless of its virulency. Emphasis is laid upon the importance of taking cultures in all persistent nasal discharge of children and attention is called to be value of the nasal bath as a prophylactic measure.

Cardiac Collapse During Examination of Post-Pharyngeal Abscess; Incision; Circulation Re-established and Maintained for Hours by Massage of the Heart; Death.

David Cheever, Boston, Mass., (*Boston Medical and Surgical Journal*, January 5, 1905.) The patient was a child of three years with post-pharyngeal swelling, who became asphyxiated during the examination. The child struggled ceaselessly. The introduction of the gag caused such choking and cyanosis that it was withdrawn, with immediate relief to the symptoms of asphyxiation. The gag was again placed in position but the condition became at once alarming and breathing ceased. The child was laid on the table and artificial respiration begun. There was no pulse at the wrist, no cardiac sounds heard with the stethoscope, and normal respiration had absolutely ceased. The abscess was opened in the Rose-Trendelenburg position, and artificial respiration, inflation of air directly into the lungs through a rubber tube, cardiac massage, sixty pressures to the minute, artificial heat and stimulation were all used without avail and continued until rigor mortis set in four and one-half hours afterward.

Death was evidently caused by cardiac collapse due to shock, in a patient whose condition of extreme exhaustion made the necessary manipulations in preparing to open the abscess a source of grave danger.

Another case is also reported in which cardiac collapse took place after incision of the post-pharyngeal abscess in a child, and where the usual measures for resuscitation were unsuccessful until hasty tracheotomy finally resulted in the re-establishment of the respiration. This patient again collapsed an hour later in the ward and was with difficulty revived. He was finally immobilized on a Bradford frame which was then inverted so that the patient hung face downward with the head at a lower level than the feet. This position afforded drainage for the abscess cavity and for the respiratory passages, kept the blood in the vital centers, and the patient finally recovered.

The third case is briefly referred to where the patient collapsed immediately after incision of a retro-pharyngeal abscess, and made slow recovery only after vigorous measures for resuscitation.

The author thinks that in cases similar to the one first reported, a preliminary tracheotomy would seem to be a conservative procedure. It could be quickly done under cocain or even without anesthesia, and although the child's struggles might be exhausting they would, at least, not be accompanied by the element of suffocation. *Richards.*

The Ultimate Results of Cauterization of the Lower Turbinate, with Therapeutic Suggestions Based Upon Histologic Findings.

J. L. Goodale, Boston, Mass. (*Boston Medical and Surgical Journal*, December 29, 1904), has examined histologically the lower turbinates from a series of cases which had in the past been cauterized for congestion or hypertrophy of the lower turbinates, and which had reported later at varying intervals with a return of the symptoms.

The removal was done with nasal scissors and was confined to the mucous membrane and the soft tissues immediately beneath. The excised tissue was placed immediately in Zenker's fluid, or in a saturated solution of corrosive sublimate. The most satisfactory method for demonstration of the fibrous tissue was found in Mallory's triple stain, which gives exceedingly beautiful pictures. In connection with this, staining by hematoxylin and Congo red was employed for the purpose of demonstrating the nature of the glands, whether mucous or albuminous. Paraffin sections are stained in the customary way in either aqueous alum hematoxylin, or in Delafield's hematoxylin, washed several hours, then stained in 1-10 to ¼% Congo red for one to five minutes, washed in 95% alcohol to remove excess of stain, dehydrated in absolute alcohol, cleared in xylol and mounted.

He finds as a result of these examinations:

(1) Caustic applications to the nasal mucous membrane may cause a loss of the columnar, ciliated epithelium, with a replacement of this by cells of a squamous type.

(2) Such applications may cause an obliteration of the canaliculi in the basement membrane.

(3) Immediately below the cauterized mucous membrane, new connective tissue may be formed, which extends downward to a depth dependent upon the intensity of the trauma.

(4) The contraction of the tissues which is observed clinically to follow caustic applications is due to the contraction of this new-formed connective tissue, and the subsequent compression both of the lymph sinuses, and of such cavities as the lumina of blood vessels and glands.

(5) Repeated superficial applications of caustics tend to the formation of connective tissue immediately beneath the epithelium, which by its contraction may constrict the lumen of the ducts of the glands, and lead to cystic dilatation of the latter. This phenomenon may contribute to a subsequent return of the nasal obstruction. Such applications become progressively of less avail, owing to the relatively impervious barrier presented by the pavement epithelium and compact fibrous tissue immediately beneath.

Where the object is to contract a relaxed or distended mucous membrane, an endeavor should be made to reach the submucous and deeper layers, at the same time producing the minimum amount of disturbance in the mucous membrane itself. This is best done by deep, narrow linear applications either of chromic acid or of the galvano-cautery, or by submucous cauterization.

If, on the other hand, the endeavor is to diminish the amount of nasal fluid, as in some forms of excessive postnasal secretion, broad, superficial applications to a definite area of the septum and lower turbinates posteriorly may be used.

In the event of recurrence of the enlargement after cauterization it is probable that the mucous membrane is very impervious and resistant and has an increased amount of connective tissue than was originally present, and that subsequent cauterization is less likely to bring about contraction of the parts. Here it is probably best to dispense with further cauterizing and instead to excise a definite amount of obstructive tissue. *Richards.*

On the Radical Operation for Chronic Empema of the Frontal Sinus According to Killian.

ESCHWEILER, BONN. (*Archives of Otology*, Vol. XXXIII, No. 5.) The author reports eight cases and consider's Killian's operation therapeutically and cosmetically the best treatment for chronic empyema of the frontal sinus.

In a sinus shallow vertically, but deep antero-posteriorly, removal of the floor is very arduous. Great care must be exercised in preserving the attachment of the tendon of superior oblique muscle with the periosteum. Then detach the trochlea in toto and afterward attach it by suture to the supraorbital bridge. If diplopia follows, it is likely to be but transient.

In no case had the author any iritic irritation. He emphasizes, however, the fact that the eyeball should be spared all pressure and should not be used as a support for numerous artery clamps. He immediately ligates all blood-vessels.

While taking away the interior sinus wall and retaining a supra-orbital bridge use very sharp chisels, otherwise one may produce a fracture of the bridge.

In making a broad communication with the nose, resect the frontal process of the superior maxilla with cutting forceps and do not tear away adherent spicules of bone for fear of injury to the lachrymal sac. Where the anterior part of the middle turbinate is to be resected, this should be done under cocain anesthesia prior to the Killian procedure.

It is especially important that the whole floor of the frontal sinus be removed up to the point of junction with the upper wall, so that no bony recess may remain, and that the orbital soft tissues may rise and fill the cavity.

On account of the complicated structure of the accessory cavities of the nose, anatomic healing is not always possible. The author considers it a satisfactory result when (1) The cutaneous incision is closed. (2) the frontal-sinus region is no longer tender on pressure. (3) No marked diplopia (4) The patient is able to work. *Campbell.*

A Case of Supposed Primary Tuberculosis of the Pharyngeal Tonsil.

DONALD M. BARSTOW, (*New York Medical Record*, October 8, 1904), reports the removal under cocain of a soft, friable mass of adenoid tissue from a man of 24, who is in good health, but who, for the past three of four months, has suffered from a continuous bad cold in the head, with a good deal of expectoration, and who, about a month ago was found by his attending physician to have tubercle bacilli in the sputum. The day before the operation was done, the patient's sputum contained innumerable tubercle bacilli, and quite a large number of streptococci. Fifteen days after the operation examination of the sputum showed only a very few tubercle bacilli, which were present either isolated or in small groups. Five months afterwards he had gained eleven pounds, and the sputum was negative as to tubercle bacilli.

The adenoid tissue contained six or eight small rounded areas of epithelioid cells, separated by a fine fibrillated reticulum. One nodule showed a caseous center, at the margin of which was a large oval giant cell with chiefly polar nuclei. Several isolated giant cells were observed also within the epithelioid cell nodules, but always single and eccentric. These giant cells had fibrillated prolongations continuous with the intercellular reticulum above mentioned, "the collective features corresponding to the classical description of the histologic structure of a tubercle nodule before caseation has occurred."

The writer regards this as a case of primary tuberculosis of the hypertrophied pharyngeal tonsil, basing his conclusions on the fact that two years of cough, with a large quantity of bacilli would ordinarily have indicated a fairly extensive lung lesion, which was not present. Finally, there was an immediate improvement of the symptoms, with almost complete disappearance of bacilli from the sputum, seeming to prove that the tuberculous adenoid was the main lesion if not the primary one. *Richards.*

III.—MOUTH AND PHARYNX.

Hypertrophy of the Lingual Tonsil.

J. J. Richardson, Washington, D. C. (*American Medicine,* September 3, 1904. The cough is the most prominent symptom, and may give the impression that the patient is suffering from tuberculosis, especially if other symptoms such as rupture of the varicose veins or gastric disturbances be present. The author regards 20% as a moderate estimate of the number of public speakers and singers subject to this condition, the principal symptom of which in their case is fatigue in singing and speaking. For treatment he prefers the lingual tonsillotome of Myles. This, if used under the influence of 10% cocain solution is not painful. If swallowing is painful after the operation, orthoform can be insufflated. The operation should not be performed on tuberculous patients.

Richards.

A New Pathogenic Throat Organism.

B. H. Stone, Burlington, Vt. (*Medical Record,* August 13, 1904.) In the winter of 1903-04 there appeared throughout the state of Vermont cases of an acute inflammatory condition of the throat, accompanied by a severe but not fatal toxemia, lasting from twenty-four to forty-eight hours and then subsiding. Cases were ushered in with a chilliness, pain in the head and limbs, coryza, and an unusual amount of sneezing. The tonsils were more or less swollen in nearly all cases, with edema of the soft palate and uvula, and in many there was a distinct false membrane, white in color, and very tenacious. Of 81 cases studied bacteriologically, 44 showed a membrane, but the author regards this percentage as probably too high, as in most of the cases examined, they were also cultured for suspected diphtheria. The toxic symptoms subsided in two days, leaving in most cases an irritable condition of the mucous membrane, persisting for some time. The attacks were not confined to any particular age, and affected both old and young. Cultures taken from the throat showed the pure culture of a diplococcus. The diplococcus occurs in the secretions and exudations of the inflamed mucous membrane. When stained by Loeffler's stain, one or both of nearly every pair has a distinct metachromatic ganule which stains very intensely. When stained with fuchsin, the granule does not show. One of the pair is often smaller than the other. In preparations made from bouillon or blood serum cultures, the pairs are clumped in irregular bunches, apparently held together by some gelatinous material which does not stain. They stain readily by Loeffler's and fuchsin and by Gram's method, although the clear space between the members of the pair and the polar granules are best seen with the first stain. They possess no flagella, spores, or demonstrable capsule. Almost no growth occurs in gelatin and there is no liquefaction.

On an agar plate grown at 37° C. for twenty-four hours round regular colonies appear. They are white, raised (pulvinate), and very tenancious, so that it is impossible to take up any of the colony without taking it all. They grow very little larger than the head of a shawl pin.

On agar streak cultures the character of the growth is similar to that on plates. The white colonies are first discrete, regular in outline and pulvinate, but gradually they coalesce along the line of the needle tract, and the result is a more or less continuous nodular growth. Growth is never luxuriant, however, and does not spread laterally far from the needle tract.

On blood serum growth is quite luxuriant, appearing first as moist, glistening, white colonies, which soon coalesce, forming a viscid, extremely tenacious skin over the whole surface of the medium. The medium is not liquefied.

Five animals were inoculated, three of whom died, and in two of whom the experiments were negative. At the autopsy only a slight subcutaneous edema with a collection of white, viscid, tenacious pus was found around the peritoneal wound, while the peritoneal cavity contained much semi-solid tenacious exudate, which microscopically showed fibrin, pus cells and diplococci. Blood serum cultures made from the peritoneal exudate resulted in the growth of a pure culture of this diplococcus.

The author regards this organism as the etiologic factor in the above described throat cases, even though efforts to reproduce this peculiar lesion on the mucous membrane of laboratory animals have been so far unsuccessful, and for the following reasons:

1. Because it has been found constantly present in these cases in almost pure cultures and isolated while no other organsims are constantly found.

2. Because it is not generally found in healthy throats. An examination of over two hundred cultures, made from healthy throats, have failed to show this diplococcus in hardly any case in which it could not be explained as persisting after an acute attack.

3. Because it is toxic for laboratory animals producing on serous membrane an exudate analogous to that produced in the throat, from which exudate it has been recovered in pure culture.

4. Because it produces a soluble toxin sufficiently virulent to kill animals.

Because its blood serum growth has a peculiar viscid character, suggesting the extreme viscidity of its exudate in the throat. *Richards.*

Two Cases of Vincent's Angina, and One of Noma, in Which the Organisms Characteristic of the Former Affection Were Found.

RANDLE C. ROSENBERGER, Philadelphia (*American Medicine*, July 23, 1904). The conditions known as Vincent's Angina is a diphtheroid angina, characterized by a grayish or whitish pseudomembrane, and at times with a pronounced adentitis, which may be very easily confounded with true diphtheria. It usually attacks one tonsil or the neighboring pillars. At the height of the affection the tonsil is covered by a grayish or whitish plaque, is soft in consistency, easily detached by scraping, and on being removed leaves a bleeding surface with reformation of the membrane the next day, becoming thicker and softer on the third and fourth days. The bacillus which causes the affection is 10 to 12 microns in length, does not stain by Gram's method, and is often, though not constantly, associated with a fine spirillum. This bacillus is the Bacillus fusiformis, is pointed at the ends and somewhat bulging at the center, occurs in bundles, frequently in pairs, as diplobacilli, radiating at an acute angle to one another, or at times irregularly grouped. It forms vacuoles and other degeneration forms, does not generate spores, stains by Gram's method and possesses long flagella, one at each end and two on each side. Pure cultures have not been obtained. The accompanying spirillum (Spirochaetis denticola) is thin and long, does not stain by Gram's method, and stains faintly with all dyes and has not been cultivated in pure culture. It is generally looked upon as a saprophyte of the buccal cavity but can overcome its saprophytic existence and become pathogenic in the presence of other microorganisms.

Cultivation and inoculation experiments are generally negative. Vincent's angina is communicable only within very narrow limits. The lesion cannot be produced by these organisms upon healthy mucous membrane or skin; there must be some pre-existing wound. For example, it may occur after tonsillotomy, or through the bleeding gums of scorbutics.

Three cases are reported. The first, female, age 22, slight soreness of the throat for three days attended by pain upon swallowing. There was slight swelling and edema of the right tonsil and pillars of the fauces with an exudate of a dirty gray color upon the pillars and upon several tonsillar crypts. Removed with difficulty, leaving a bleeding surface. Two days later the symptoms complained of were disappearing, and in four days the exudate was almost gone. There was no rise of temperature nor other systemic symptoms.

The second case was in a child of nine months. There was a grayish, adherent white membrane to the gums and posterior fauces. On removal there was a bleeding surface. In a few days the child was well.

The third case, a child of three suffering from noma. In her the whole left cheek was gangrenous. Spreads were made from the margin of the process nearest the mouth.

Spreads made from the affected areas in these three cases contained numerous cellular elements, mostly polymorphonuclear leukocytes, few lymphocytes, together with squamous epithelial cells, and a few shreds of fibrin.

From diphtheria the lesion can most readily be differentiated by making spreads from the affected area, which will show the two associated organisms.

There seems to be no doubt that the disease here reported upon, Vincent's angina, is a distinct, clinical and pathological entity, and due to infection by the symbiotic fusiform bacillus and spirillum of Vincent. That it is not more often described and diagnosed seems to be due to the fact that only inoculations upon culture media, and no spreads from the affected area or areas are made. *Richards.*

Tonsillar Ulceration in General.

Thomas J. Harris, New York City. (*American Medicine*, July 23, 1904.) By "primary" is here meant all those forms of tonsillar ulceration in which the ulcerative process has its origin in the tonsil and represents the entire cycle of the disease.

Membrano-ulcerative tonsilltitis—the so-called angina of Vincent is probably the most frequent. As this condition clinically somewhat resembles diphtheria and syphilis, it is important to differentiate it from them. The microscope is necessary in some instances. The author thinks some cases of Vincent's angina have probably been diagnosed as syphilis or diphtheria. This disorder has a definite course, terminating in a few days with healing of the ulcer and subsidence of the glandular involvement.

Acute lucunar ulcerative tonsilltitis occurs in young persons; nothing characteristic in the way of symptoms; discomfort referred to the throat rather than real suffering. On the affected tonsil there is a smooth elevation surrounded by a zone of inflammation, the rest of the gland being to all appearances normal. Ulceration follows the elevation but without increase of symptoms. The ulcer is covered with a brownish detritus, and in three or four days it can invade the entire tonsil, but does not pass this limit. The cicatricial stage comes on gently. No specific microbe has as yet been discovered. Many bacteria have been found, mostly streptococci, staphlococci, and slender rods. The chief interest to the clinician lies in the differential diagnosis. Pseudodiphtheric ulceration is of importance on account of its resemblance to diphtheria, from which only bacteriologic examination will enable one to differentiate it oftentimes. This affection may be benign, but occasionally the symptoms are very severe. There is a high fever, adenopathy and dysphagia, suggesting a polymicrobic diphtheria. The false membrane is thick, friable, grayish-bloody in appearance, resembles diphtheria, and may involve the pharynx and nasal fossae. It persists three days and is followed by irregular ulcers of varying depth.

The secondary form of this affection is seen most often in connection with scarlet fever at the eruption period, and may be of two degrees of severity, varying from the benign form, healing in eight or ten days, to the grave form producing constitutional infection, suppurations, etc., and the septic form, causing septicemia and death.

Gangrene of the tonsil may rarely produce primary ulcer. The primary ulceration of the tonsil due to syphilis occurs, and may be passed over unless looked for. This ulcer is not extensive and is confined to the tonsil. Primary tuberculous ulcer of the tonsil is extremely rare.

The secondary ulcerations are briefly referred to, the principal causes of these being diphtheria, typhoid, tuberculosis, lupus, syphilis, secondary and tertiary, and malignant disease.

Richards.

Bone and Cartilage in the Tonsil.

James E. Newcombe, New York. (*The Medical News,* September 24, 1904). Case is that of a woman of 30 years with moderately enlarged faucial tonsils. The right tonsil was removed with the MacKenzie instrument without incident, but on attempting to sever the left one as the blade of the instrument was driven home, the sensation was experienced of driving through some hard substance which, however, was easily pierced. Examination of the tissue showed the presence of a small rounded tip of bone. Palpation of the tonsillar stump showed that this tip belonged to the styloid process, the remainder of which could easily be made out.

Richards.

Report of a Case of Primary Lupus Vulgaris of the Oropharynx and Nasopharynx Treated by X-Rays.

H. S. Birkett, Montreal. (*Medical Record*, December 24, 1904.) The patient, a boy of 15, was first seen in November, 1902. Previous health good. One brother and three paternal uncles died of pulmonary tuberculosis. Patient occupied the room in which his brother died of tuberculosis. Lymphatic glands in the neck much enlarged. On the lateral and partly on the posterior walls of the pharynx are two distinctly nodular growths, each nodule being about the size of a swollen sago-grain, quite separate and distinct in the central portion of each mass, but merging into another at the periphery. The infiltration on each side has invaded the posterior pillar about 2 mm., and each is separated from the other by a superficial ulceration 10 mm. wide. The adjacent structures, tonsils and anterior pillars, are not involved. Examined with the mirror the growths were found to extend upward to the cushion of each Eustachian tube, but not into the posterior nares. The pharyngeal surface of the uvula showed two distinct nodular infiltrations, each about the size of a lentil.

Under ether the greater portion of the masses was removed. The pathologic report showed numerous tubercles in the submucous tissue. These consisted of a central portion of young fibrous tissue with numerous typical tuberculous giant cells. Tubercle bacilli were present but few in number. A guinea pig, inoculated in the peritoneal cavity with portions of the tissue, died in three days from septicemia. A second one inoculated in the groin was found to have general glandular tuberculosis. Koch's tuberculin was used, the patient's temperature rising to 101 in twelve hours, and falling to normal in thirty-six hours. Local treatment of curetting and lactic acid in glycerine were used without any result.

In January, 1903, the patient went home, returning in April of the same year with the local condition practically unchanged. He was then treated with the x-rays for twenty-ty-three treatments, the face being protected by a piece of wood which had been painted with eleven coats of white lead on each side, sufficient to shut out all unnecessary x-rays. This wood was 12 in. x 12 in. and had a hole in the center about three inches in diameter. The patient opened his mouth as widely as possible and held the screen close to his face and in such a position as to let the x-rays pass through the hole in the screen and strike directly on the back of the throat. The enlarged cervical glands were next removed, and the x-ray treatment then continued until at the end of July the local conditions had entirely disappeared. Four months later it was found the disease was again showing itself by a small ulcer situated in the left nostril. The pharyngeal surface of the uvula was also infiltrated by three small tubercles, the naso-pharynx and oro-pharynx being in a healthy condition. The x-ray treatment was again used with satisfactory results. *Richards.*

IV.—LARYNX.

The Surgical Treatment of Laryngeal Tuberculosis, Especially by Means of Galvano-Cauterization.

MERMOD, (*Archives Internationales de Laryngologie*, September, 1904.) A strong plea in favor of the surgical treatment of tuberculosis of the larynx as the only scientific and effectual means for a cure. The writer considers in detail the various objections against such form of treatment. That occasionally tubercular ulcers in the larynx heal of themselves under general treatment is true. It occurs only after a long time and the poor who represent a large proportion of those so affected cannot afford such treatment. Others claim surgical interference tends to spread the disease besides being useless. Such has not been the writer's experience. He is a firm believer in the existence, not so uncommonly, of primary tuberculosis of the larynx. In such cases he believes surgical procedures are above all called for. In selected cases with secondary lesions he claims to succeed even as well. The generalization of the disease by such a course of treatment is only coincidental. A cure is to be claimed, regardless of the eventual termination of the disease when the function of the organ has been restored and the tissues resume their normal character.

Surgical treatment is demanded as soon as infiltration exists. Lactic acid has a certain value not superior to other chemical substances. The submucous injection is more effective than in any other way, but is very painful, and besides causing reaction may aggravate the local process.

Laryngeal electrolysis has been successful in a number of cases. Removal of the diseased tissue by means of the Heryng-Krause forceps is theoretically the ideal method. It has, however, the grave objection that serious bleeding may follow, which it is hard or impossible to control. Edema may also follow. For this he employs the following formula by inhalation.

R

Acid carbolic	15
Potass. chlorat	15
Glycerin	100
Water	900

Galvano-cauterization avoids both hemorrhage and edema. The instrument should be delicately constructed, so as to give a good view of the field of operation. Thorough and complete cocainization is absolutely essential to success in application. This is secured by preliminary injection of morphin twenty minutes before beginning use of cocain. This lessens greatly the quantity of cocain necessary and serves to overcome the usual tendency to swallow on the introduction of the instrument. The cautery needle is to be used not superficially but is to be plunged thoroughly into the diseased tissue and allowed to burn continually or intermittently till a cavity is created.

No edema follows, but there is an active and more lengthy reaction than with the cutting forceps which may require the use of orthoform locally. At least two weeks should elapse before a second sitting, the patient meanwhile to use the phenochlorate inhalation.

Extended histories of patients treated by the different methods of treatment separately or together are given. At a recent congress in Lausanne, the writer presented 18 cured patients.

Out of 280 treated, many of whom did not continue treatment, he reports 60 healed for one year or less, 40 healed for two years, 17 healed for three years. Such an optimistic showing deserves to be read in full.

Some Phases of Chronic Laryngitis.

Z. L. LEONARD, New York. (*Medical Record*, July 30, 1904.) Several cases are reported, all of which show the necessity of careful examination of the larynx in all cases of cough not yielding readily to treatment, and the value of the institution of proper local treatment to any lesion which may be present. Many cases of chronic catarrhal inflammation will respond to treatment, and even if not cured, are very much improved. *Richards.*

Laryngitis Hypoglottica Acuta.

CHARLES W. RICHARDSON, Washington, D. C. (*Washington Medical Annals*, March, 1904.) The area most frequently affected is the immediate subcordal portion of the larynx, the infiltration of which becomes so great as to be fraught with danger to the life of the affected one. The acute exanthemata and the causes which predispose to acute laryngitis are the principal etiologic factors. The whole larynx is rarely affected. Pathologic changes are characterized by intense inflammatory redness of the affected portion of the larynx, and partial or diffuse, either unilateral or bilateral swelling of the affected portion of the mucous membrane.

The voice may or may not be very much disturbed; there is a croupy cough, slight stridulous breathing, acceleration of the pulse, moderate rise in temperature. The breathing becomes embarrassed and the stridor more pronounced as the case progresses. The extraordinary muscles of respiration are called into play; there is sinking in of the epigastrium and at the suprasternal notch during inspiration. The child's anxiety and distress become very apparent, cyanosis supervenes, and the pulse becomes small, rapid and thready. Unless relief is afforded through subsidence of the swelling by natural resolution or through mechanical means, the progress is to a fatal termination.

In the supracordal type the laryngeal picture is that of an intense deep redness of the mucosa, and when the false cords are the seat of infiltration, they bulge out so as to nearly or quite overlap the true cords. In the subcordal type the picture is even more strikingly characteristic. On deep inspiration during inspection there will be seen two intensely red folds of mucosa, apparently immediately beneath the vocal bands, which are immobile during inspiration and expiration.

The differential diagnosis between this condition and laryngeal diphtheria cannot always be immediately made. In diphtheria the voice is more apt to be very hoarse or aphonic than in hypoglottic laryngitis, where the voice may be almost normal. In diphtheria there is more apt to be paroxysms of intense dyspnea, followed by periods of easier respiration, while in hypoglottic laryngitis the breathing is not paroxysmally worse but gradually and progressively worse. The presence of pharyngeal deposits, when a view cannot be obtained by the laryngeal examination, simplifies the differentiation. The result of a culture will demonstrate the absence or presence of the Klebs-Lœffler baccillus.

Treatment of this condition consists in the use of expectorants, free purgation, ice externally, the generation of steam in the room, and the local application or spraying into the larynx of a mild solution of silver one per cent. and suprarenal extract. If the respiration becomes very embarrassed or the child shows exhaustion, intubation or tracheotomy becomes necessary.

The author reports six cases, five of whom recovered. The sixth one died on the second day after intubation, from pneumonia. Two of the other cases required intubation for periods of from four to twelve days. *Richards.*

A Lecture on Acute Septic Inflammations of the Throat and Neck.

SIR FELIX SEMON, London, (*Brooklyn Medical Journal,* January, 1905), regards all septic inflammation of the neck as of common origin, and thinks that the classification which separates them in accordance with the particular part affected is an incorrect one; that the symptomatology of acute glossitis, of edematous pharyngitis and laryngitis, of acute edema of the larynx, of abscess of the larynx, of phlegmonous pharyngitis and laryngitis, of erysipelas of the larynx and of angina Ludovici are, with the exception that the commencement of the affection in one case is located a little higher up or in the other little lower down and in one case the exudate is serous and in another purulent, very much like one another.

There are two classes of pathogenic organisms; those which have a specific action and those which have merely an inflammatory effect. Of the specific bacteria there are great numbers, but the bacilli of tuberculosis, of pest, of relapsing fever, and diphtheria are the most important, and whenever these organisms produce any effect, it is always one and the same.

The specific organisms are large in number, the most prominent and representative of which is the streptococcus pyogenes, but all of these forms of organisms are more or less interchangeable with one another and all produce one and the same effect, namely inflammation. The blood vessels are attacked, become dilated, there is an alteration of wall and augmented transudation and increased permeability of the walls with emigration of leucocytes, and this emigration is the main symptom. Besides the sterptococcus pyogenes there are many other pathogenic bacteria; the various forms of the staphylococcus, the albus, aureus, flavus and citreus, the bacterium coli, the pneumococcus, the bacilli pyogenes fetidus, the tetragenus and the pyocyaneus.

Sir Felix regards these micro-organisms as interchangeable in the sense that they all may produce different forms of inflammation according to their quantity, virulence and to the nature and condition of the tissues of the body they invade. There is no pathogenic organism which always produces a serous exudate and none that always causes a purulent one. The characteristic of the inflammation depends upon the quantify and virulence of the invading organism and the resistance of the tissues where it makes its habitat. In the throat the tonsil is usually the part where localization takes place. This is easily explained by the anatomic structure of the parts, since the epithelial covering of these glands shows gaps large enough to allow of a transit of leucocytes, so that their crypts invite pathogenic micro-organism to make the tonsils their first habitat. But the organism may enter through any abrasion; may be on the tongue, the affection then being called a glossitis, or in the larynx, starting as an edema of the larynx, etc., the question where the disease is first located being purely accidental.

He reports three cases of severe septic infection.

Case one was a well known London surgeon, who, the day previous to the seizure, was perfectly well. Was taken ill with an acute septic inflammation of the throat; on the following evening tracheotomy had to be performed, followed in three days by death.

Case two was perfectly well the day before the attack. Tracheotomy was done that very night but he died in three days.

Case three. Patient was in perfect health the evening before, but awoke the next morning with a violent chill, quickly followed by great difficulty in swallowing, with profuse perspiration. Sent for physician. Aphagia followed. Diagnosis made of tonsillitis and edema of the larynx with commencing pneumonia. Temperature, 104; hoarsenes rapidly increased; general dyspnea became threatening; whole pharynx bluishly discolored; epiglottis and arytenoid cartilages the same color; enormously edematous, covered by frothy secretions; patient was sitting upright in bed, covered with perspiration, in great distress. Sir Felix was about to leave the house, but before doing so went to the wife of the patient and discussed the matter of the possible necessity of a tracheotomy. He had hardly begun to speak when the door was opened and the family doctor called: "Come, he is choking." He followed, found the patient moribund, did an instant tracheotomy with a penknife and succeeded in opening the trachea, while calling to the daughters of the patient to bend some hairpins, by means of which he held the sides of the trachea asunder. Artificial respiration was carried out for fully 15 minutes, but the patient was dead. In this case the whole disease did not last eleven hours.

In spite of the fact that the three cases he reports all died, he thinks that the treatment of these cases may not be absoluely hopeless; that even though apparently most threatening, retrogressive changes may occur and recovery be brought about.

The onset of the disease is usually manifested by rigor, followed by quick rise of temperature, the symptoms of an ordinary sore throat or tonsillitis. The patient complains of violent sore throat, and in the course of a few hours grave dysphagia supervenes. On examination of the larynx there may be simply congestion, or, in the more severe cases, infiltration, or even considerable edema of the parts. In the more severe cases in a few hours after the initial pharyngeal symptoms, the dysphagia passes over into complete inability to swallow, the patient becomes hoarse, and this hoarseness in turn quickly passes into complete aphonia. The epiglottis is red, enormously tumefied, dyspnea quickly increases, and tracheotomy is usually necessitated within twenty-four hours after the onset of the first symptoms.

For treatment there seems comparatively little to do unless there is fluctuation, when incision is to be done, and tracheotomy is to be performed as soon as threatening dyspnea makes its appearance. Intubation can be tried, but on account of the enormously distended structures of the larynx, would seem to be rather contra-indicated. If one could know the invading bacterium, an anti-toxic serum, formed by culture from that bacterium, would seem to be the indicated remedy. Sir Felix states that a few patients have been saved by using an anti-streptococcus serum prepared, not from one definite bacterium only, but by uniting the cultures of the various streptococci into one serum, in the hope that if not one, yet another may represent the proper antidote in the given case. In serious cases in which one is unable to ascertain immediately the nature of the pathogenic organism, he advises 20 c. c. to begin with and the repeating of this two or three times a day. It can do no serious damage, and may possibly save the patient. He thinks that in all cases the bacteriologic diagnosis should be secured if possible, but if it is not possible, inject the anti-streptococcus serum on chance.

Ludwig's angina, first described by an old Würtemberg practitioner who flourished about 1830, he regards as nothing but an infiltration of the neck, sometimes serous, sometimes purulent, sometimes gangrenous, of exactly the same nature as one sees in a septic pharyngitis or laryngitis. It will simply depend upon what stage of the disease the patient is seen whether, according to present terminology, a case is spoken of as Ludwig's angina, edema, erysipelas of the larynx, or as phlegmonous laryngitis or pharyngitis. Sir Felix thinks all these designations should be discarded and these affections be known simply as acute septic inflammation of the throat and neck. *Richards.*

V.—MISCELLANEOUS.

The Relation of Diseases of the Stomach to Affections of the Mouth, Nose and Throat.

ROBERT LEVY, (*N. Y. Med. Jour. and Philadelphia Med.*

Journal, Dec. 17, 1904.) After reviewing the various contributions in recent years to this question, concludes as follows:

"It appears from the foregoing that although diseases of the stomach cannot be said to be indisputably caused by affections of the mouth, nose and throat or indisputably the result of diseases of these organs, the correlation is so close that our successful management of both depends largely upon our recognition of this interdependence." *Harris.*

The Extraction of Foreign Bodies From the Bronchi.

A. Coolidge, Jr., Boston. (*Boston Medical and Surgical Journal,* October 13, 1904.) Coolidge reports four cases of extraction of foreign bodies from the bronchi with the aid of the Killian straight tube. The article is accompanied by X-ray pictures showing the location of the foreign bodies.

In case one, a silver dime was the foreign body in the trachea in a man of 35. Low tracheotomy had been done with unsuccessful attempts at seizing the coin. The X-ray showed a foreign body to the right of the median line at the fifth costovertebral articulation. With the patient on his back, without a general anesthetic, a straight urethral speculum, 3½ inches long, 7-16 inch in diameter was introduced through the tracheal wound and pushed down nearly to the bifurcation. The coin was seen in the upper part of the right bronchus and removed with alligator forceps.

Case two was a child of twenty-two months in which a shawl pin was found, head down, in the right bronchus. The trachea was opened below the isthmus of the thyroid, the tracheal speculum introduced and pushed into the right bronchus until the point of the pin entered the tube. The pin was then seized with alligator forceps and removed. The pin was 1⅞ inches long, with a head ⅛ inch in diameter.

Case three, a woman of 24, inhaled a scarf pin 1½ inches long, with a head 3-16 inch in diameter. The X-ray showed the pin with the point at the fourth interspace on the left side, and the head directly below it and about one inch from the vertebral column. The trachea was opened, Killian's bronchoscope introduced and pushed to the left bronchus. Foreign body could not be seen. The bronchoscope had to be removed. Artificial respiration was required for a few moments, as the patient stopped breathing. The next day the X-ray showed the pin in the same place, and on the third day, without a general anesthetic, the trachea having been sprayed with cocain, the tube was introduced. The pin had in the meantime become dislodged, and was seen high up in the left branchus, and was easily removed.

The fourth case, a child of eight, reported in June, 1903, that he had swallowed a nail, but was not believed. He developed a right-sided bronchitis, which, although better, had persisted ever since, with occasional, periodic, asthmatic attacks. Recently the nail was remembered, an X-ray picture taken, which showed a foreign body in the right bronchus. The interior of the larynx was sprayed with 1% cocain and the patient eitherized. With the head hanging over the end of the table, Killian's bronchoscope, (20 cm. long, 8 mm. in diameter) was introduced without difficulty, and pushed down into the trachea. The nail was seen point down in the trachea, with the point embedded in the tracheal wall. After two or three attempts the nail was freed from its impacted position, and although it slipped from the forceps, it followed the tube as it was withdrawn through the glottis, and was seized in the pharynx.

For the removal of foreign bodies in this way, the author says not only is a proper bronchoscope needed, but proper instruments for working through the tubes after it is in place. The introduction of the bronchoscope after previous tracheotomy presents no difficulties. The author is inclined to attempt the removal of inspired foreign bodies through the natural passages in most cases. *Richards.*

BOOK REVIEWS.

Ueber Fremkoerper. in den Oberen Luftwegen: für den practischen Arzt, Zusammengestellt von Dr. Friederich Hanszel, Wien, 1903, verlag von Joseph Safar.

This little monograph of 50 pages contains an account of the cases in Chiari's Clinic in which there was a foreign body in the upper portion of the respiratory tract. Altogether there were 114 cases during the eleven years of the period of observation and report. Foreign bodies in the nose numbered 51, 35 on the right side and 14 on the left and in two cases there were foreign bodies on both sides. Of the 63 cases of foreign bodies in the pharynx and larynx, the seat of trouble was the base of the tongue 10 times, the tonsils 19 and the recessus pyriformis 14. A very explicit and well arranged table of the 114 cases is appended.

Diseases of the Nose and Throat.

By D. Braden Kyle, M. D., Professor of Laryngology and Rhinology, Jefferson Medical College, Philadelphia; Consulting Laryngologist, Rhinologist and Otologist, St. Agnes' Hospital. Third Edition, Revised and Enlarged. Octavo volume of 669 pages, with 175 illustrations, and 6 chromolithographic plates. Philadelphia, New York, London: W. B. Saunders & Company, 1904. Cloth $4.00 net; Sheep or Half Morocco, $5.00 net.

The value of this work is evidenced by the fact that in a short space of time three editions have been demanded The general plan of the book is the same as that of the previous editions, such additions having been made as were rendered necessary by reason of medical progress. The most important alterations and additions have been made in the chapters on Keratosis, Epidemic Influenza, Gersuny's Paraffin Method for the correction of Nasal Deformities, and in the one on the X-Rays in the treatment of Carcinoma. The etiology and treatment of Hay Fever have been partially rewritten and much enlarged, as has also the operative treatment of Deformities of the Nasal Septum. The book is especially strong in its pathological and medical aspects; the etiology, pathology and medical treatment of most of the affections being considered at considerable length and with great clearness.

The classification of diseases is very complete and the description is clear, no less than seventeen varieties of laryngitis being described.

The chapter on general considerations of the mucous membrane is especially to be commended. The author thinks that in many cases of lesions of the mucous membrane of the upper respiratory tract, the part played by bacteria is purely secondary.

The chemistry of the saliva is considered as giving important information in regard to conditions of the blood and the general body. The author thinks the examination of the saliva will often give more real information than the examination of the urine, since the salivary secretion is a physiologic process in which physiologic material is secreted, which material when taken back into the system, serves both a physiologic and a chemical purpose.

In hay fever the chemistry of the secretion plays an important part in the individual susceptibility to the attacks, and the author has relieved a larger number of patients by altering the reaction of the secretion at the first sign of a repetition of an attack than by any other method. He finds local applications to give but slight temporary relief.

The distinctly surgical side of the treatment is not as well discussed as the medical. Too much is taken for granted. There is an insufficiency of detail as regards operative technique, and many of the well-recognized surgical procedures are either omitted or too meagrely discussed. The section on operative procedures of the faucial tonsil has less space given to it than this subject demands, and no mention whatever is made of the cold wire snare. Less than a page is devoted to the treatment of chronic suppuration of the frontal sinus, nor is the treatment as given that which has at the present time most general acceptance.

The book is illustrated with many colored plates; the drawings are exceptionally good, and as a whole it is very creditable to its author and to American laryngology.

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